Study on the comparison of intraperitoneal instillation of Bupivacaine, Ropivacaine and saline for postoperative pain relief after laparoscopic intra abdominal surgeries.

DISSERTATION submitted for the degree of

Doctor of medicine

(Branch – X) Anaesthesiology

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY,

CHENNAI

INSTITUTE OF ANESTHESIOLOGY AND CRITICAL CARE

MADRAS MEDICAL COLLEGE

CHENNAI

April 2013

CERTIFICATE

This is to certify that this dissertation entitled

'Study on the comparison of intraperitoneal instillation of Bupivacaine, Ropivacaine and saline for postoperative pain relief after laparoscopic intraabdominal surgeries '

is a bonafide record of the work done by Dr.R. SUJATHA under my supervision and guidance in the Institute of Anaesthesiology & Critical Care at Rajiv Gandhi Government General Hospital of Madras Medical College, Chennai during the period of her post graduate study from May 2010 to April 2013 for the partial fulfilment of M.D.(Branch X - Anaesthesiology) degree.

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I am immensely grateful to **PROF. Dr.M.VASANTHI M.D., D.A.,** Director and Professor, Institute of Anaesthesiology and Critical Care, for her concern and support in conducting this study.

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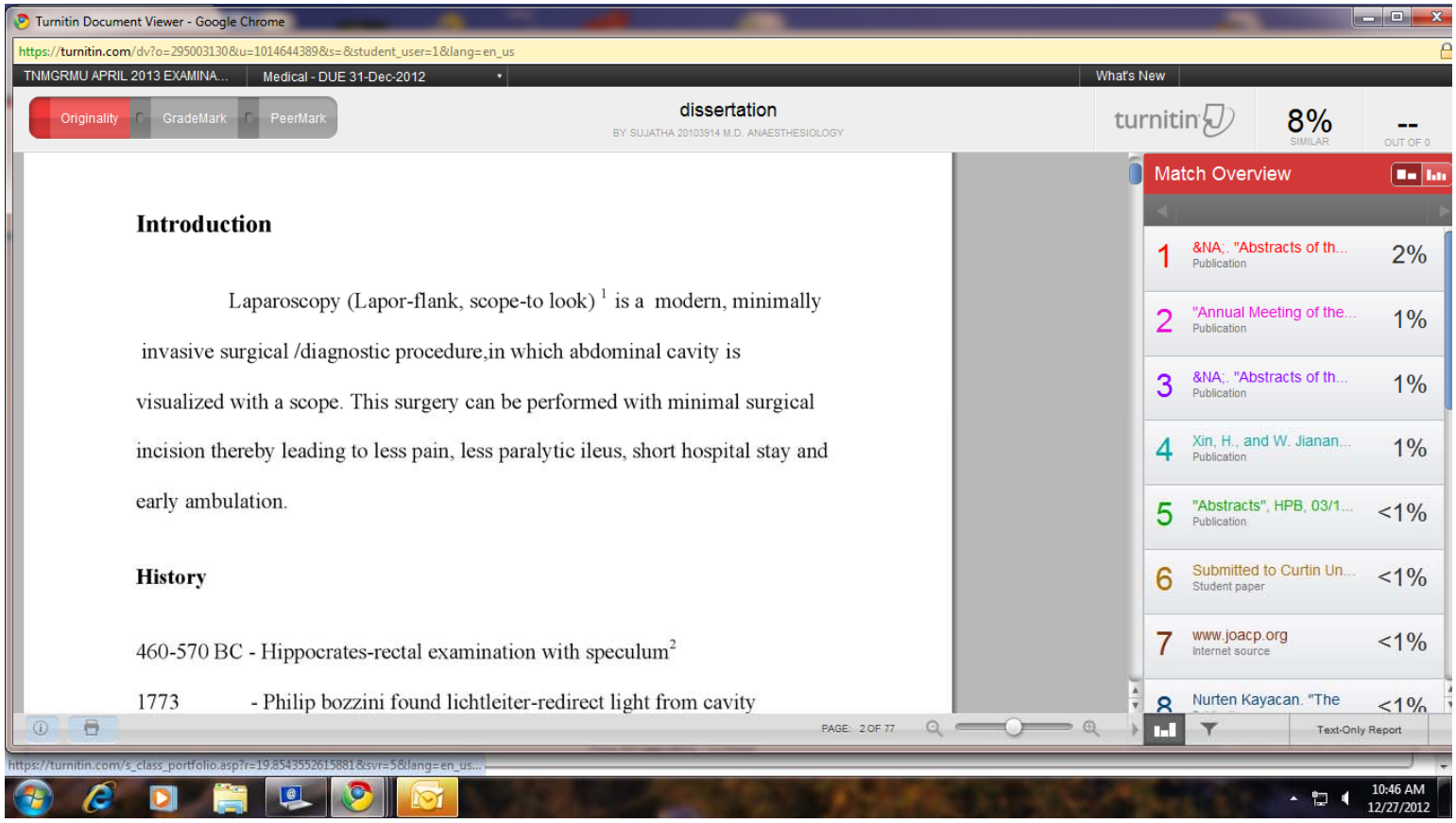
I am thankful to the Institutional Ethical Committee for their guidance and approval for this study.

I am thankful to all my colleagues and friends for their help and advice in carrying out this dissertation.

I am grateful to my family for their moral support and encouragement.

Last but not least, I thank all the patients for willingly submitting themselves for this study.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Introduction
Laparoscopy (Lapor-flank, scope-to look) [1] is a modern, minimally invasive surgical /diagnostic procedure,in which abdominal cavity is visualized with a scope. This surgery can be performed with minimal surgical incision thereby leading to less pain, less paralytic ileus, short hospital stay and early ambulation.
History
460-570 BC - Hippocrates-rectal examination with speculum[2]
1773 - Philip bozzini found lichtleiter-redirect light from cavity
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CONTENTS

Introduction

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History

460-570 BC - Hippocrates-rectal examination with speculum[2]

1773 - Philip bozzini found lichtleiter-redirect light from cavity of illumination to the viewer eye

1902 - George kelling - koelioscopie & laparoscopy to dog

1910 - Christian jacobeus-first laparoscopy in human, coined the name laparothorocoskopie

1982 - Kurt semm- insufflators &Harold Hopkins-fibro optics

1987 - Philippe Mouret- first laparoscopic cholecystectomy.

1994 - Robotic laparoscopic surgery.

PAIN

"THE PAIN OF SURGERY WAS TORTUROUS" said by **Celsus** in the pre anaesthetic era.

Pain is a Greek word derived from the name **POINE**, the Greek Goddess of revenge.

DEFINITION OF PAIN:

International Association for the Study of pain has defined"pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pain is always underestimated and under treated. Pain relief is an important goal of Anaesthesia.

Any degree of pain is significant to a patient. It is argued that any amount of reduction in the pain is beneficial, when the treatment is not associated with any adverse effect. It makes a difference in duration of hospital stay and time of ambulation.

PAIN IN LAPAROSCOPIC SURGERY:

In abdominal surgeries, the cause of pain is

1. Somatic

2. Visceral.[3]

Somatic pain is due to skin incision and the visceral pain is due to handling of the intestine and peritoneal inflammation. During open surgeries, both somatic and visceral pain will be present which may not be tolerable to a patient with out adequate analgesia. In Laparoscopic surgeries somatic pain is very less due to a small skin incision. But visceral pain is more prominent due to visceral nociceptor stimulation .Visceral Pain may occur due to rapid distension of peritoneum, intraperitoneal inflammation, traction of nerves and vessels, diaphragmatic irritation (shoulder tip pain).

Post laparoscopic pain can be minimized by following ways[1]:

- creating the pneumoperitoneum slowly ,
- aspiration of gas under the diaphragm which lets out the residual CO_2 ,
- keeping gas drain,
- using low pressure and heated gas,
- using nitrous oxide pneumoperitoneum,
- instillation of local anaesthetics under the diaphragm,
- rectus sheath block,
- surgery under subarachnoid block,

- peri- operative NSAID’S and opioids.

Intra peritoneal local anaesthesia is a simple, cheap and safe method of providing post operative analgesia.

MECHANISM OF ANALGESIA:

Intraperitoneal local anaesthetics acts by blocking the visceral nociceptors, thereby, decreasing the visceral pain in laparoscopic surgeries. It also has anti inflammatory action and prevents peritonitis and bowel adhesion. Visceral nociceptors will be stimulated by handling of the viscera and the peritoneum causing inflammation and pain.

AIM OF THE STUDY

Aim of the study is to evaluate the efficacy of intraperitoneal instillation of local anaesthetics for post operative pain relief after laparoscopic abdominal surgeries and compare the efficacy of two different local anaesthetics- Bupivacaine vs Ropivacaine in terms of

1. Duration of post operative pain relief
2. 24 hour post operative analgesic requirement
3. Post operative nausea and vomiting
4. Post operative hemodynamic changes like pulse rate, Blood pressure.
5. Complications

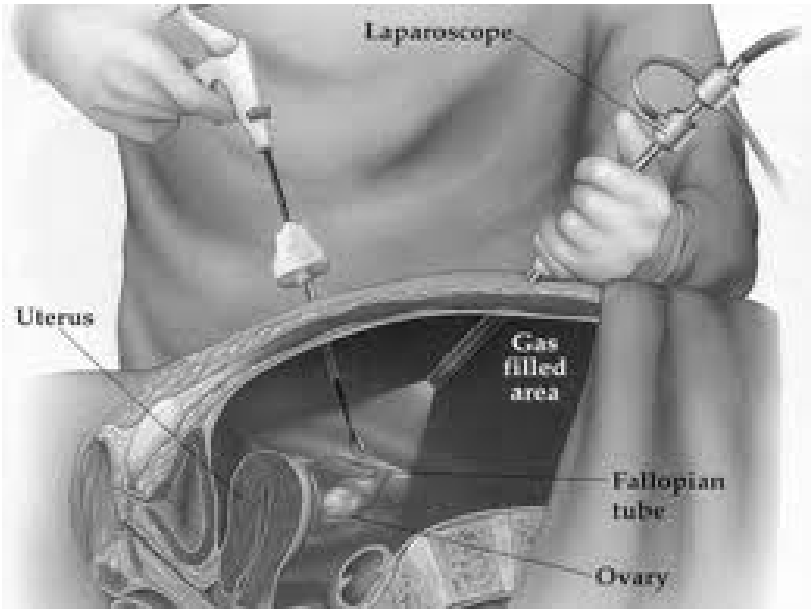
LAPAROSCOPIC SURGERY AND ANAESTHESIA[4]:

Laparoscopic surgeries are minimal invasive surgeries during which an inert gas is insufflated into the abdomen to diagnose and operate. It is used in gastrointestinal, gynecological , urological and vascular surgeries.

PHYSIOLOGICAL CHANGES DURING LAPAROSCOPY:

During laparoscopy certain patho physiological changes occurs in the patients. Creation of pneumoperitoneum and alteration of patient position predispose to these changes.

LAPAROSCOPIC SURGERY



CHANGES THAT OCCUR DUE TO PNEUMOPERITONEUM:

Respiratory changes:

Insufflation of gas into the peritoneal cavity causes decrease in thoroco-pulmonary compliance, basal atelectasis due to elevation of diaphragm, decrease in functional residual capacity leading to ventilation perfusion mismatch.PaCO2 will increase progressively and will reach a plateau in 15 to 30 minutes after CO2 pneumoperitoneum.

Causes of increase in PaCO2 is multifactorial. This might be due

- to impaired ventilation,
- absorption of CO2 from the peritoneum,
- ventilation perfusion mismatch and
- Patient positioning.

If laparoscopy is done under local anesthesia, this hypercapnia will be compensated by increase in respiratory rate in such spontaneously breathing patients.

Cardiovascular changes with pneumoperitoneum:

In laparoscopic surgeries, marked hemodynamic changes occur in cardiovascular system due to the effect of CO2 absorption, positioning of the patient, anesthetic agents and pneumoperitoneum per se.

When the intra abdominal pressure is >10mmhg, it will cause inferior vena caval compression and pooling of blood in the lower extremities, which decreases the venous return to the heart thereby reducing the cardiac output.

Degree of change in cardiac output depends upon the change in the intra abdominal pressure. When the intra abdominal pressure is < 10mmHg, hemodynamic alteration is not significant. Significant alteration in hemodynamics occurs, when the intra abdominal pressure is > 10 mmHg after insufflation.

Increase in intra-abdominal pressure also increases intra thoracic pressure, which increases the peripheral vascular resistance. Mechanical stimulation of peritoneal receptor releases catecholamines and vasopressin, which contributes to increase in the peripheral vascular resistance.

Arrhythmias can also occur during laparoscopy. Sudden stretching of the peritoneum will stimulate the vagus nerve inducing arrhythmias including bradycardia and asystole.

Changes in the regional blood flow

Due to pneumoperitoneum and head up position, venous stasis in the lower extremities can occur, which may predispose to deep vein thrombosis. It also decreases the renal blood flow, glomerular filtration, and urine output. But after deflating the abdomen, renal blood flow increases and hence the urine output.

PROBLEMS DUE TO POSITIONING:

Cardio Vascular system:

Due to head down position, there will be a rise in central venous pressure which in turn raises the cardiac output. Stimulation of baroreceptors causes systemic vasodilatation and bradycardia. This position also increases intracranial tension and intra ocular tension.

Respiratory system

Head down position causes elevation of the diaphragm which may cause basal atelectasis, reduction in functional residual capacity and lung compliance. It also increases the airway pressure. These changes are more marked in obese, old and debilitated patients.

Nerve compression:

Head down position may cause hyper abduction of the arm, which predisposes to brachial plexus injury. If the patient is placed in lithotomy position for a long time (gynecological surgeries), it may injure the common peroneal nerve.

ANAESTHETIC TECHNIQUES

Laparoscopic surgery can be done under

1. Local anaesthetic infiltration
2. Epidural anaesthesia
3. Spinal anaesthesia
4. General anaesthesia

LOCAL ANAESTHESIA:

In local anaesthesia with intravenous sedation, short gynaecological procedures like laparoscopic sterilization can be done.

ADVANTAGES:

- Early recovery
- Less post operative Nausea and vomiting.

- Less hemodynamic changes
- Early diagnosis of complications.

DISADVANTAGES:

- Patients anxiety
- Pain

Regional anaesthesia:

In laparoscopic surgery under Epidural and spinal anaesthesia, muscle relaxation will be very good but a higher level is needed. Post operative shoulder tip pain will not be present in epidural or spinal anaesthesia.

Advantages:

- Less usage of sedatives and Narcotics.
- Good muscle relaxation
- Less shoulder tip pain
- Good post operative pain relief

COMPLICATIONS:

Complications are common after any surgery. Laparoscopic surgery is not an exception either. Complications common with laparoscopic surgeries are

- Pneumo thorax.
- Pneumo mediastinum
- Pneumo pericardium
- Endo bronchial intubation – due to endotracheal tube migration
- CO2 gas embolism
- Risk of Aspiration.
- Intestinal injuries
- Vascular injuries

Although all the above mentioned complications are related to surgery, Anaesthetists must be adequately prepared to diagnose and respond to the complications.

Post operative changes after laparoscopic surgery:

Stress response:

Though Laparoscopic surgeries are less invasive, the stress response that occurs in a patient undergoing Laparoscopic surgery is similar to an open surgery. Plasma cortisol, catecholamine level, urinary cortisol, urinary catecholamine level were same after both surgeries.

Post operative pulmonary dysfunction:

Postoperative respiratory dysfunction is less after laparoscopic procedure than open procedures. It is more common after upper abdominal laparoscopic surgeries than pelvic laparoscopic surgeries. It is more severe in older patients, known COPD patients and obese patients**.**

Pain:

Post operative pain is more in open abdominal surgeries. Laparoscopic surgery allows a greater reduction in post operative pain and analgesic consumption. After a Laparoscopic surgery, patients complain more of visceral pain (Biliary colic, pelvic spasm and shoulder tip pain) than parietal pain.

Post operative Nausea & Vomiting:

Intra operative opioid and Nitrous oxide contributes to postoperative nausea and vomiting. Intraoperative propofol use for induction, draining the gastric

contents, intraoperative use of Droperidol, transdermal scopolamine all can reduce post operative nausea and vomiting markedly.

Alternatives to CO2 Pneumo peritoneum:

1. Helium gas

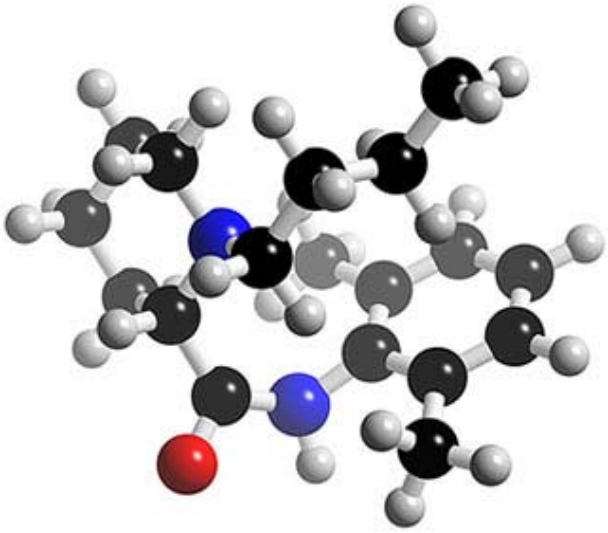
2. Argon gas

3. Nitrous oxide Pneumo peritoneum

4. Gasless Laparoscopy – Abdominal wall lift method

PHARMACOLOGY OF BUPIVACAINE[5]

BUPIVACAINE

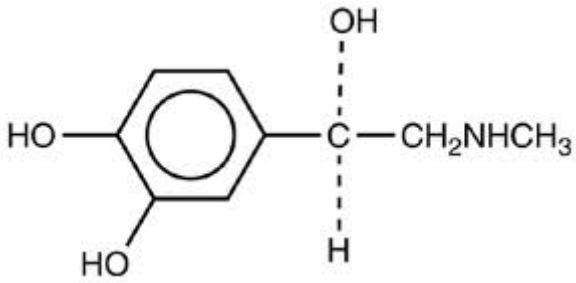


Bupivacaine is an amide group of local anaesthetic agent. **A.F.EKENSTAM** first used Bupivacaine.

PHYSIO CHEMICAL PROPERTIES

It is 1-butyl pipecoloxylidide. Clinically it is used as a racemic mixture containing both ‘R’ and ’S’ form.

It has a longer duration of action, moderate onset of action, highly potent, highly plasma protein bound, highly lipid soluble. It crosses the placenta and blood brain barrier because of its high lipid solubility.



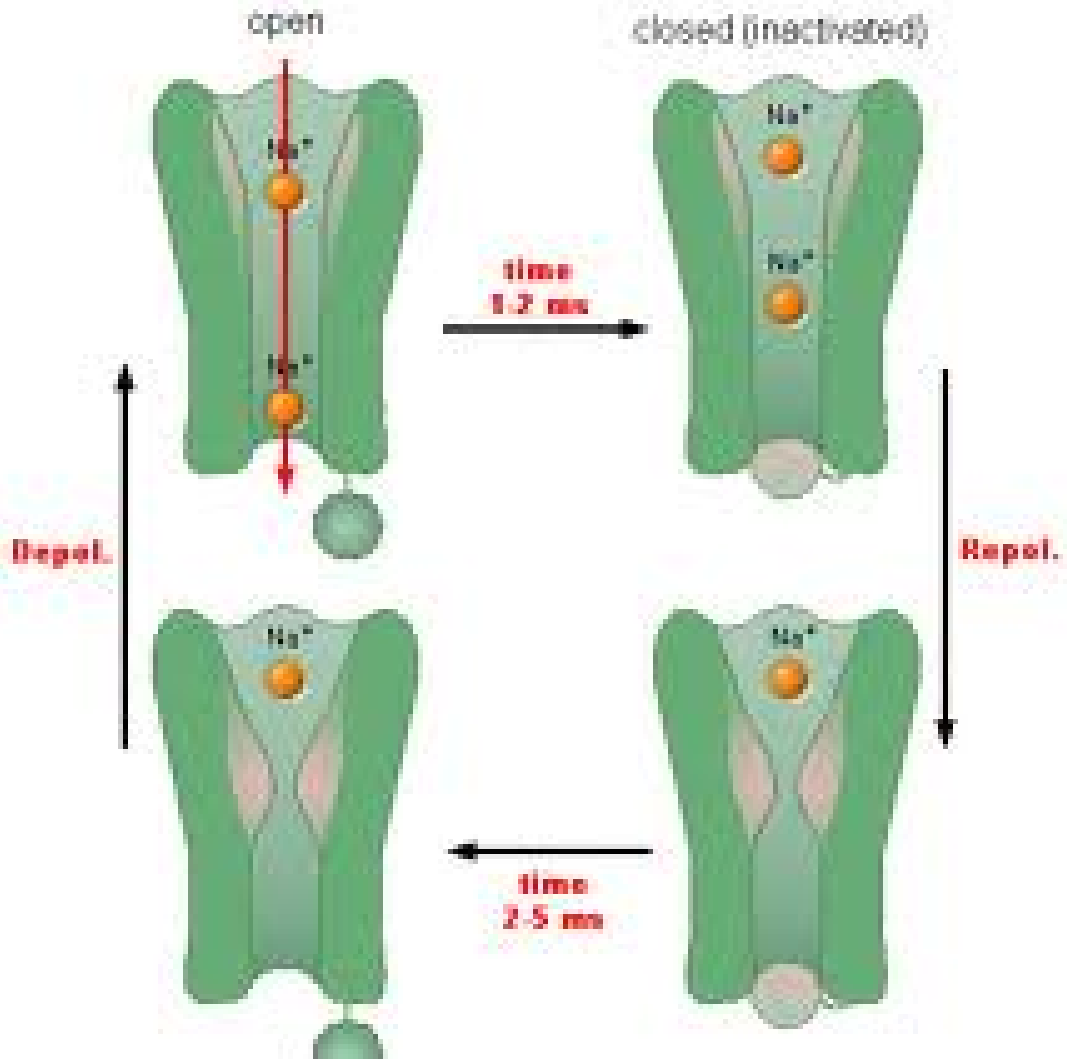
BUPIVACAINE

1. Pka	-	8.1
2. Molecular weight	-	288
3. Protein binding	-	95%
4. Lipid solubility	-	28
5. Elimination half life	-	210 minutes
6. Toxic plasma concentration	-	5 to 10µg/ml

MECHANISM OF ACTION:

Bupivacaine acts by blocking the voltage gated sodium channels in the neurons and delays the process of depolarisation.

VOLTAGE GATED SODIUM CHANNEL



PHARMACO KINETICS:

Absorption:

It mainly depends upon the site of injection, dosage, volume, addition of vasoconstrictors. Due to high lipid solubility, it easily enters the nerves and the blood vessels.

Distribution:

It occurs in 2 phases - α phase, β phase.

α phase - rapid uptake – highly perfused organ

β phase - slow redistribution – moderately perfused organ

Metabolism:

It occurs in the liver by N-dealkylation, amide hydrolysis and conjugation into pipecolyloxlidine.

Excretion:

5% of Bupivacaine excreted unchanged in kidney

PHARMACOLOGICAL EFFECT:

Local - it blocks the nerve conduction.

Regional - touch, pain, temperature, motor, Vascular tone will be lost in that region

Systemic effect - cardio vascular and CNS toxicity

ROUTES OF ADMINISTRATION:

1. Sub arachnoid space.
2. Epidural space.
3. Peripheral nerves.
4. Local infiltration.
5. Skin surface

RECOMMENDED MAXIMUM DOSE:

2-3mg/kg

TYPE OF ANAESTHESIA AND CONCENTRATION:

1. Spinal anesthesia - 0.5%

2. Epidural anesthesia - 0.25% - 0.75%
3. Peripheral nerve block - 0.25% - 0.5%
4. Infiltration - 0.25% - 0.5%

TOXICITY:

Bupivacaine causes systemic toxicity whenever the plasma concentration exceeds to exert the cardiovascular, central nervous system side effect.

Cardio Vascular toxicity:

Bupivacaine blocks the cardiac sodium channel and decreases the myocardial automaticity and decreases rapid depolarisation phase to produce prolonged myocardial depression. So intravascular injection causes hypotension, AV block, and arrhythmias like ventricular fibrillation.

CNS toxicity:

When compared to cardiovascular system, central nervous system is more vulnerable to Bupivacaine toxicity. Initial symptoms of CNS toxicity are circum oral numbness, paresthesia, dizziness, blurring of vision, followed by restlessness, agitation, confusion followed by generalized tonic clonic seizure.

TREATMENT:

Treatment includes immediate resuscitation measures, oxygenation, ventilation, airway care, circulatory support. Inj.Thiopentone 1-2 mg/kg to terminate seizure. Intralipid 20% 1.5 ml/kg followed by 0.25ml/kg/min infusion for next 10 hours, Bretylium and Amiodarone can be given for resistant ventricular tachycardia.

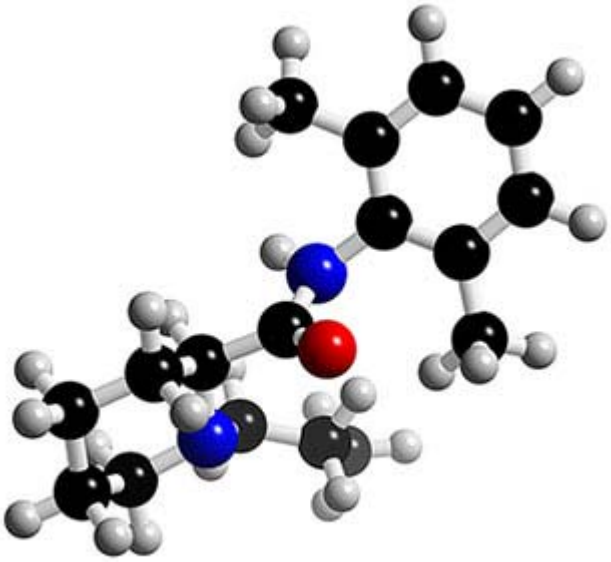
CONTRAINDICATIONS:

Hyper sensitivity to local anaesthetic agent.

Intravenous regional anaesthesia

PHARMACOLOGY OF ROPIVACAINE

ROPIVACAINE:



Ropivacaine is a amide group of local anaesthetics first synthesized in 1957 which have a structure of 1-propyl,2,6-pipecoloxylidide. It is available as S- enantiomer.

PHYSIO CHEMICAL PROPERTIES:

1. Molecular weight - 274

2. pKa - 8.1

3. Lipid solubility - less

4. Protein binding capacity - 94

5. Onset - moderate

6. Duration -

7.Elimination t1/2 - less than bupivacine.

MECHANISM OF ACTION:

Ropivacaine acts by blocking the voltage gated sodium channel by binding with the α subunit of sodium channel from inside the cell. So it prevent the rate of raise and magnitude of action potential.

PHARMACO KINETICS:

ABSORPTION:

Absorption of ropivacaine from the site of deposit is influenced by site, dose , concentration and addition of adrenaline. Apart from this, age , cardiac function , hepatic functions also determine the absorption.

Distribution :

Similar to Bupivacaine, it has dual phase distribution in which Ropivacaine initially distributed into highly perfused organs like Brain and heart followed by least perfused organ like skin and muscle.

Metabolism :

Ropivacaine is metabolized in the liver by aromatic hydroxylation and N- dealkylation by liver microsomal enzymes.The metabolite was 2,6 pipecoloxylidide and 3- hydroxyl ropivacaine. Among the amide group Bupivacaine and Ropvaciane under go slowest metabolism.

Excretion :

Ropivacaine gets excreted in urine as 1% as unchanged.Clearance of Ropivacaine is higher and elimination half life is shorter when compared with Bupivacaine. So when compared with Bupivacaine, Ropivacaine is least toxic and short duration.

PHARMACOLOGICAL PROPERTIES:

Local - it blocks the nerve conduction.

Regional - touch, pain, temperature, motor, vascular tone will be lost in the region. Sensory block is more than motor block with Ropivacaine

Systemic effect - cardio vascular and Cns toxicity

CLINICAL USES :

1. Sub arachnoid block - 0.75%
2. Epidural - 0.5 to 1%
3. peripheral nerve block - 0.5 to 1%
4. Infiltration - 0.2 to 0.5%

RECOMMENDED MAXIMUM DOSE:

2-3 mg / kg

TOXICITY :

Toxic profile of Ropivacaine is lower than Bupivacaine.

Cns toxicity :

Peri oral numbness , dizziness , tinnitus , blurring of vision , finally convulsions may occur.

Cardio vascular Toxicity :

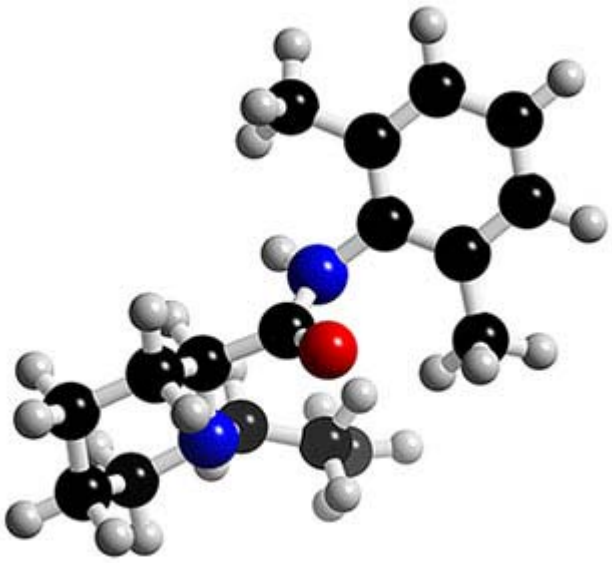
Accidental intra vascular injection may causes Hypo tension , Brady cardia ,arrhythmia like ventricular fibrillation, ventricular tachycardia, heart block, Cardiac arrest .

TREATMENT OF TOXICITY :

1. Maintanence of Airway , Breathing , Circulation
2. Treating the convulsion with Inj, Thio pentone , Midazolam.

PHARMACOLOGY OF ROPIVACAINE

ROPIVACAINE:



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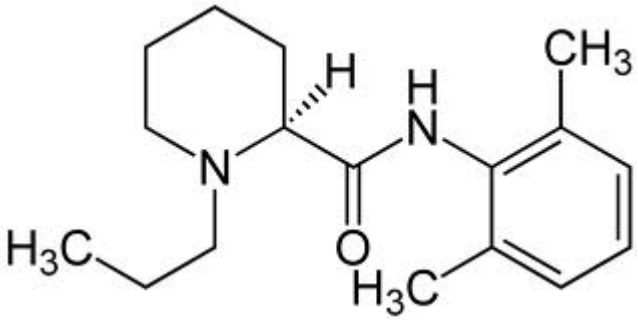

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4. Protein binding capacity	-	94
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6. Duration	-	200 – 360 min

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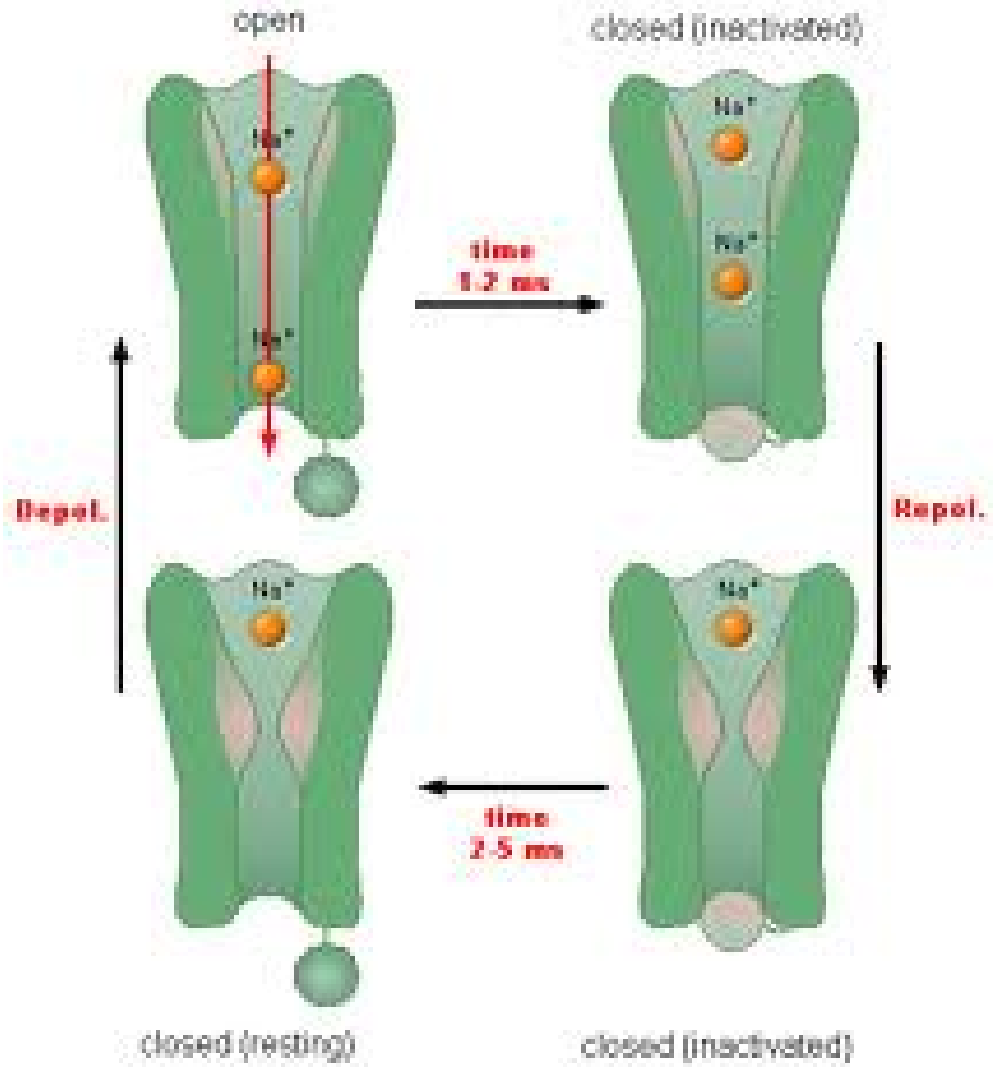
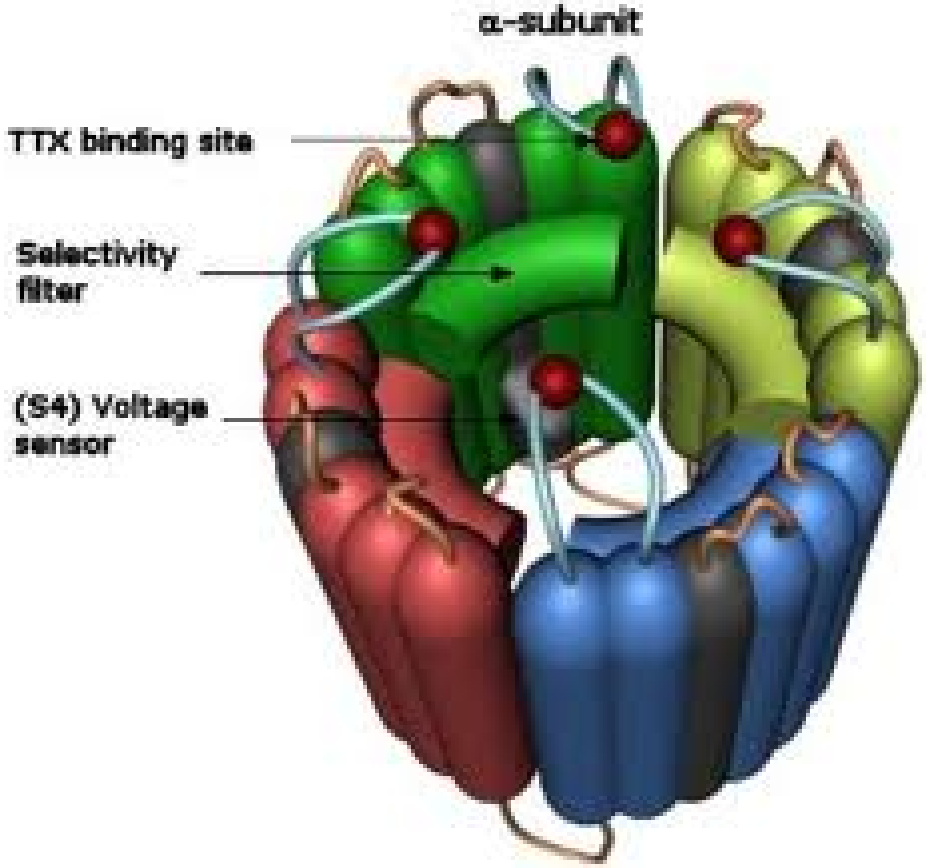
Voltage gated sodium channel



α sub unit of sodium channel



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Cardio vascular Toxicity:

Accidental intra vascular injection may causes Hypotension, arrhythmias like bradycardia, ventricular fibrillation, ventricular tachycardia, heart block and even cardiac arrest.

TREATMENT OF TOXICITY:

Treatment includes immediate resuscitation measures, oxygenation, ventilation, airway care, circulatory support. Inj. Thiopentone 1-2 mg/kg to terminate seizure, Intralipid 20% 1.5 ml/kg followed by 0.25ml/kg/min infusion for next 10 hours, Bretylium and Amiodarone can be given, if necessary.

REVIEW OF LITERATURE

1. **Andrei Goldstein and Patrik Grimault etal**[6] compared the effects of intraperitoneal local anesthetic instillation for reducing the post operative pain and morphine consumption, which was assessed while the patient wakes up and on the first post operative day, after laparoscopic gynecological surgeries

Totally 180 patients were taken in their study and were randomly divided into 3 groups. Group B received 20ml 0f 0.5% Bupivacaine with

1:200,000 Adrenaline, group R received 20ml of 0.75% Ropivacaine. They used numerical pain scale for pain assessment and four point scale for evaluating postoperative nausea and vomiting. Inj.Morphine i.v was given as rescue analgesia whenever the numerical scale was >4 and further dose of subcutaneous morphine was given to keep the VAS <4.

There was a statistically significant reduction in the post-operative pain in both Ropivacaine and Bupivacaine group when compared with saline group. Total Morphine consumption in 24 hrs postoperative period in group B was 3.08mg ±5.12(mean ± 2 SD), group R was 0.69mg ± 1.58, group S was 12.93mg ±9.30. Morphine consumption at wake up in group B was 0.92mg ± 2.27, group R was 0.25 ± 1.89, group S was 4.18 ± 3.98. There was a significant reduction in post operative nausea and vomiting in both groups compared with saline group.

2. **H.kang,B.Gkim et al**[6] studied about the effectiveness of intra peritoneal instillation of Ropivacaine in laparoscopic appendicectomy. It was a randomized double blinded prospective study in which totally 63 patients were allocated into 2 groups. group C received normal saline and group I received 2mg/kg Ropivacaine intra peritoneally after creating the pneumoperitoneum.

VAS score, total Fentanyl requirement, frequency of pushing the button in PCA noted.

There was a considerable reduction in pain score in group I compared with group C ($p<0.005$) . Total amount of Fentanyl consumed in the study in control group was 420µg compared with Ropivacaine group which was about 300µg. Frequency of pushing the button in PCA was lower in Ropivacaine group compared to control group. There was no significant difference in vomiting incidence and duration of hospital stay between the two groups. No complication was noted between the groups. (The journal of international medical research 2010 ,38,821-832)

3. **Alexander et al**[7] have conducted a meta analysis about the efficacy of intraperitoneal instillation of local anaesthetics.

They have taken totally 24 various randomized control studies to analyse. Their analysis have included the studies which used Bupivacaine, Levobupivacaine, Ropivacaine, Lignocaine, Bupivacaine with Adrenaline for intra peritoneal instillation. They analyzed the effect of local anaesthetics on the VAS score(0-100mm) /verbal pain score (0-10) /additional dose of analgesic requirement /frequency of analgesic requirements.

Among them, 12 studies showed a statistically significant pain relief during the first 4 hours with weighted mean difference VAS of 9mm with 95% confidence interval (-13 to 15 mm). Weighted mean difference VAS measured before the surgical dissection was 6mm (95% confidence interval -10mm to -2mm) and after the surgical dissection was 13mm (95% confidence interval -19mm to -8mm). There was no significant adverse effect noted in any trials.(Anaesthesia Analgesia September 2006 vol 102,682-688)

4. **N.Malhotra et al**[8] studied about the effect of intraperitoneal Bupivacaine for post operative pain relief after gynecological surgeries.

They have taken the patients, who have undergone Laparoscopic gynecological surgery under ASA I,II. They have divided the patients into 2 groups. 50mg of 0.125% Bupivacaine was given intraperitoneally to Bupivacaine

group and 30ml of saline was given intraperitoneally to saline group. Post operative VAS score, time and dose of analgesic requirements were noted.

VAS score was significantly less in Bupivacaine group(mean VAS=2) when compared to saline group (mean VAS 6,4) at 2^{nd} hour and 4^{th} hour with p value(<0.0001) but there was no difference after 6^{th} hour and 8^{th} hour with mean VAS 3,3 and 4,5 in both group at 6^{th} hour and 8^{th} hour. There was a significant difference in analgesic requirement between 2 groups with p value 0.006.There was no significant difference in nausea, vomiting, shoulder tip pain between 2 groups.(The Internet Journal of Gynecology and Obstetrics. 2006 Volume 5)

5. **J. W. Szem, L. Hydo et al**[9] conducted a study about the effect of intraperitoneal instillation of Bupivacaine for controlling the post operative pain after laparoscopic cholecystectomy. There were totally 55 patients for evaluation. Among the 55 patients 26 were received 0.1% Bupivacaine as 100ml irrigation solution over the hepato diaphragmatic surface before the dissection. 29 patients received saline intraperitoneally in the same manner.

Duration of post operative pain relief, post operative analgesic usage, incidence of post operative nausea, vomiting noted.

There was a significant reduction in post operative pain in Bupivacaine group when compared with saline group with p value <0.005.There was no

reduction in analgesic requirement, post operative nausea ,vomiting or pain at the shoulder tip.(Journal of Surgical Endoscopy January 1996, Volume 10, Issue 1)

6. **Muhammad Riswan khan et al**[10] conducted a study in 206 patients about the efficacy of intraperitoneal instillation of two different local anesthetics.

All the 206 patients were randomly allocated into 2 groups of which group L received 10ml 0f 2% lignocaine and group B received 10 ml of 0.5%Bupivacaine intraperitoneally.

Abdominal pain was less in both Bupivacaine and the Lignocaine group with a P value <0.001 .When compared with lignocaine group(87%), little higher dose of opioid was needed for Bupivacaine(94%) group p=0.057. They found out that there was no significant difference in pain relief in between group L,B. (Journal of Surgical Research)

7. **CananKucuk et al**[11] in their study compared Placebo with Bupivacaine, Ropivacaine in two different doses in the prevention of post-operative pain after laparoscopic cholecystectomy.

Totally 80 patients were taken, and they randomly divided into 4 groups - group S, group R1, group R2, group M who received saline, Ropivacaine 100mg-with Adrenaline 1:200,000, Ropivacaine 150 mg-with Adrenaline1:200,000, Bupivacaine 100 mg respectively inside the peritoneum after the end of the

surgery. They used PCA pump for post-operative analgesic delivery. They compared the VAS score, 24 hour morphine requirement, sedation, hemodynamics, respiratory rate in the postoperative period over 24 hours.

There was a significant reduction in the VAS score in all 3 groups except saline group in 1,2,12 hours. Total dose of morphine consumed in saline group is significantly higher when compared with the other groups with p value<0.001 in all the 24 hours. With in the group, morphine consumption is significantly less in group R2. There was no significant difference in MAP, Heart rate, respiratory rate, sedation scale, complications in between all the 4 groups. (Surgery Today (2007)

8. Todorov G et al[12] compared the effect of intraperitoneal Levo bupivacaine to relieve the pain after laparoscopic cholecystectomy. There were two groups studied of which one received inj. Levo Bupivacaine, another group received saline injection intraperitoneally after the dissection. Visual analogue scale and total need of analgesics was compared post operatively.

There was a significant reduction in abdominal pain in Levo Bupivacaine when compared with the saline group at second hour (p=0.038), sixth hour after surgery (p=0.028).and Levo Bupivacaine group consumed less analgesia. (Khirurgiia (Sofiia).

9. Kocamanoğlu et al [13]. They and their colleagues studied about the use of intraperitoneal Bupivacaine and Ropivacaine to relieve the abdominal pain and shoulder pain after laparoscopic surgery. They have taken totally 55 patients of which 17 received 20ml of 0.5% Bupivacaine, 18 patients received 20 ml of 0.75% Ropivacaine intraperitoneally. Post operative pain was noted for 24 hours. They concluded the study with results in which shoulder pain were less in groups received Bupivacaine and Ropivacaine intraperitoneally. (PMID:16552651 PubMed)

10. **Artemisia et al [14]** conducted a trial in 71 patients about the repeated instillation of local anesthetics (Levo Bupivacaine) intraperitoneally to relieve the pain after surgery.

Totally 2 groups of which one group received 0.5% Bupivacaine intra peritoneally after the dissection and eight hours after surgery. Control group received saline in the same period. They compared the VAS score, opioid requirement in two groups. Levo Bupivacaine group showed less visual analogue scale when compared with saline group. Total Fentanyl requirement was significantly less in the study group when compared with the saline group.

11. **Alkhamesi et al**[15] conducted a study about the intraperitoneal effect of local Anesthetics to decrease the pain after laparoscopy surgeries.

Total 80 patients were divided into 4 groups. Each group received aerosolized Bupivacaine, saline and local infiltration of Bupivacaine in bladder bed compared with control group .Pain score and the opioid requirement were compared which were significantly lower in Bupivacaine group compared with the other group (Pub med:17180268).

12**. Hernández et al** [16] They in their study added morphine with Bupivacaine and gave intraperitoneally to assess the efficacy of pain relief after laparoscopic cholecystectomy.

Among the 90 patients 30 received 30ml of 0.25% Bupivacaine, 30 patients got 30ml of 0.25% Bupivacaine with 2mg morphine intraperitoneally, 30 patients were in control groups. Pain score (VAS, VRS), total dose of Metamizol via PCA were noted.

Results were analyzed. Except during the second hour there was no difference in the pain score in all the 3 groups. Metamizol consumption was significantly lower in both group 1,2($p<0.05$).

13. **Mraović B et al** [17] compared totally 80 patients. They randomly divided them into 2 groups, Out of which one group received 15ml 0f 0.5%

Bupivacaine, both during the starting of the surgery and after the surgery. Second group received saline in the same manner.VAS scale was compared at half an hour, 4, 8, 12, 24 hours post operatively.

Pain score was lower in study group when compared with saline group. But this difference was upto 8 hours. Analgesic requirement were lower in study group.

14. **Barczyński M et al**[18] Their study evaluated the optimum timing for instillation of local anesthetics intraperitoneally to give maximum analgesic effect.

There were totally 4 groups. Out of which, one group received 2mg/kg Bupivacaine instilled before CO2 insufflation (A group), 2nd group received the same dose after insufflation (B).3rd (C),(D)4th group received saline in the same manner. Post operative VAS score, analgesic need, rate of analgesic requirement

noted. Lower VAS scores were recorded in Bupivacaine group at 4th, 8th hour and not after that. Compared to B, C, D group, A had less shoulder tip pain, lower analgesic need, long latency of analgesic requirement were noted. Intraperitoneal instillation of local anaesthetic agent before CO2 insufflation was found to be more effective.

15. **Dreher JK et al**[19] They conducted a study about the effect of intraperitoneal local anesthetic agent after the laparoscopic gynecological surgeries. They used Ropivacaine 200mg intraperitoneally after the end of the surgery and compared with saline.VAS score, total opioid requirement, post operative vomiting compared.

Ropivacaine group showed less VAS(0.97) during the second post operative hour when compared with the saline group(2.03) which was statistically significant ($p<0.05$).Total Fentanyl requirement was less in study group 40µ when compared with saline group 104 µ. Study group showed less(10%) nausea and vomiting compared with saline group(44%). (Aust N Z J Obstet Gynaecol. 2000 Nov).

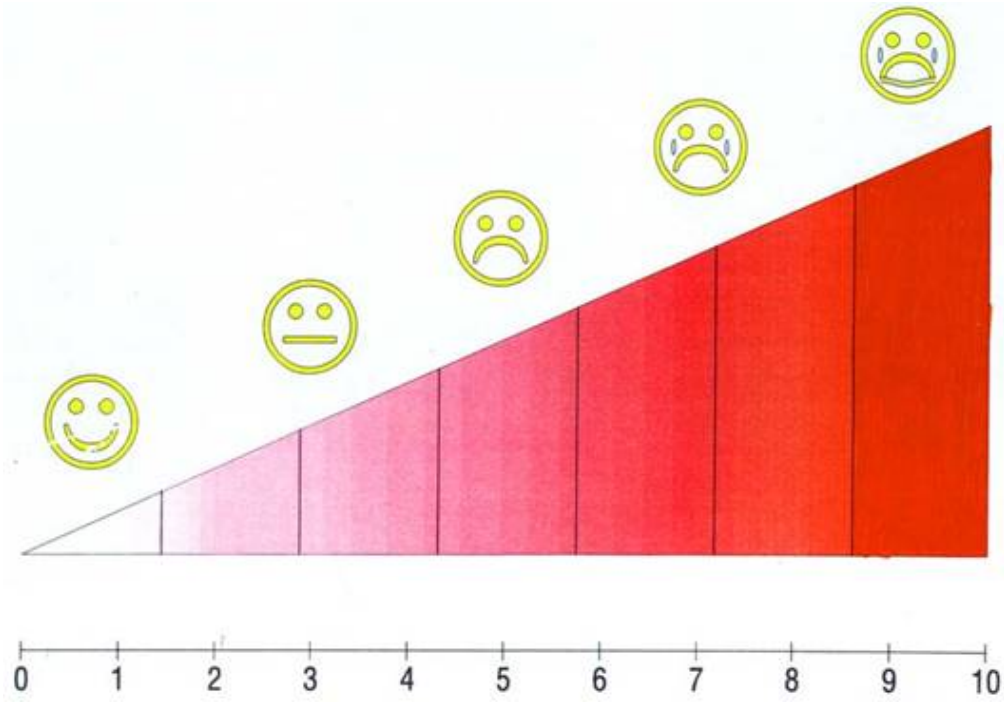
16. **Ahmed BH et al**[20] they analyzed totally 200 patients in their study. 200 patients were randomly allocated into 4 groups, group A-Control, group B received saline, group C received Bupivacaine, group D received Lignocaine

intraperitoneally.VAS scale, VRS scale were compared between 4 groups. other parameters like post operative nausea vomiting, analgesic needs were compared.

Results: Both groups C,D were showed better pain scale(VAS,VRS).Lignocaine showed better pain relief compared with Bupivacaine in their study.

17. Bucciero M et al compared intraperitoneal nebulisation of ropivacaine with saline. They have taken totally 60 patients of which 30 received 20 ml of 0.5% bupivacaine intraperitoneally and 30 patients received saline intraperitoneally after the pneumoperitoneum.

They have concluded the study in which there was no significant reduction in pain score in both groups. Patients who received Ropivacaine has less shoulder tip pain ($p<0.001$)and early ambulation compared with the control group.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MATERIALS AND METHODS:

This study is a prospective, randomized, comparative study for evaluating the efficacy of intraperitoneal instillation of Bupivacaine 0.5% vs Ropivacaine 0.5% for post operative pain relief after elective laparoscopic abdominal surgeries.

Institutional ethical committee approval was obtained. Totally 90 patients were selected. After getting the informed consent from the patients they were randomly allocated into 3 groups, group B group R, group S.

SELECTION OF CASES:

All the 90 patients both male and females were between the age group 16-70years who had been preoperatively assessed under ASA physical status I and II. They were posted for elective laparoscopic abdominal surgeries in the department of general surgery and department of surgical gastroenterology in Rajiv Gandhi Government hospital.

VENUE:

General surgery and Surgical Gastroenterology theatres. Rajiv Gandhi Government hospital, Chennai.

STUDY DESIGN:

The study was a Prospective, randomized, single blinded study in which the two groups, group B (Bupivacaine) and group R (Ropivacaine) were compared with the group C (control).

INCLUSION CRITERIA:

1. Patients of age 16 to 70 years.
2. ASA physical status I&II.
3. Patients posted for elective laparoscopic abdominal surgeries.
4. Patients who had given informed written consent.

EXCLUSION CRITERIA:

1. Patients not satisfying above inclusion criteria.
2. ASA PS III, IV&V.
3. Local anesthetics allergy.
4. Patients refusal.
5. Pregnancy.
6. Patients with CVS, respiratory, liver and renal diseases.
7. If any other surgeries combined with the laparoscopic surgery in the same sitting like incisional hernia, umbilical hernia.

STUDY GROUPS:

- GROUP B – Bupivacaine group - patients received 2mg/kg of bodyweight 0.5% Bupivacaine intraperitoneally
- GROUP R – Ropivacaine group- patients received 2mg/kg of bodyweight 0.5% Ropivacaine intraperitoneally.
- GROUP C – control group–patient received 20 ml of 0.9%saline intraperitoneally

MATERIALS:

- Intravenous set with iv fluid with 18G iv cannula
- Laryngoscope, airway, bougie, appropriate size endo tracheal tube
- Drugs- Thiopentone sodium, Glycopyrrolate, Fentanyl, Succinyl choline,Atracurium,Atropine,Adrenaline,Ephedrine,Ranitidine,Ondansetron, Bupivacaine 0.5%,Ropivacaine 0.5%,saline
- Monitors-NIBP, ECG, SPO2, temperature ,ETCO2
- VAS chart

OUTCOMES MEASURED:

Primary outcomes:

1. Post operative pain relief using visual analogue scale(0-100mm)

2. Post operative total analgesic requirement

3. Duration of analgesia

Secondary outcomes:

1. Post operative nausea and vomiting

2. Blood pressure (SBP, DBP, mean)

CONDUCT OF STUDY:

Institutional ethical committee clearance was obtained. Totally 90 patients who satisfied the inclusion criteria posted for elective laparoscopic intra abdominal surgeries were selected for the study. They were randomly allocated into 3 groups. Group B, R, S

ANAESTHESIA:

After getting the informed consent, height and weight were measured; patients were shifted into the theatre. Local anesthesia test dose was given. After confirming the absence of allergic reaction, monitors were connected (ECG, NIBP, PR, ETCO2 and SPO2) .Basal parameters were noted.

Patients were premedicated with inj. Glycopyrrolate 0.04mg, pre oxygenated with 100% O2 for 3min with bag and mask. Induction was carried out with inj.Fentanyl 2mic/kg, inj. Thiopentone 5mg/kg and intubated with an appropriate size endo tracheal tube after a loading dose of inj. Atracurium (0.5mg/kg), maintenance of anesthesia was with N2O:O2 2:1,sevoflurane 1-2%,inj Atracurium 0.1mg/kg .No extra dose of analgesia was given intra operatively

SURGERY:

All the surgeries were done by trained surgeons. After skin incision 11mm trocar is introduced via umbilical port, abdomen is inflated with CO2 1 lit/min with intra abdominal pressure kept around 12-14mmHg, in all patients.

After the procedure gets over, abdomen was thoroughly washed to remove the blood clots and debris. Inj. Bupivacaine (preservative free) 0.5% 2mg/kg with 10ml distilled water/ Inj. Ropivacaine (preservative free) 0.5% 2mg/kg with 10ml distilled water /30ML of normal saline is instilled intra peritoneally under vision. After the removal of trocar, CO2 gas was completely evacuated from the

abdomen. Patients were kept in Trendelenberg position for 10minutes.If abdominal drain was present it was clamped.4ml of 2% Lignocaine was infiltrated into the skin. During the surgery ETCO 2 value was maintained between 25 to 35 mmhg.

After the skin closure, adequate spontaneous ventilation and neuromuscular recovery patients were reversed with inj. Neostigmine 40µ/kg and inj.Glycopyrrolate 0.4mg iv and extubated.

POST OPERATIVE PERIOD:

All the patients were shifted to PACU for observation. Primary and secondary outcomes were measured. VAS Score at 0, 1, 2, 3, 4, 5, 6,10,12,24 hours were noted. Inj. Fentanyl 1µ/kg i.v given as the rescue analgesia whenever the VAS score were more than 3.Total dose of Fentanyl required was noted in these periods. Time of the first rescue analgesic requirement was noted. Presence of complications was noted.

STATISTICAL ANALYSISIS

Statistical analysis were done with statistical package for social sciences (SPSS for windows, version 15)

- Results are expressed as mean and standard deviation.
- All qualitative variants were compared using Chi Square test and quantitative variants using students‘t’ test.
- A ‘p’ value of less than 0.05 was considered significant.

OBSERVATION AND RESULTS

Totally 90 patients were included in our study. There was no significant difference in terms of age, sex, height, weight, BMI and duration of surgery between the three groups and shown in Table 1 to 5.

Table 1.Demographic profile: Age

Group	Number	Mean	SD	P value
control	30	35.30	11.26	0.081 N.S
Ropivacaine	30	29.37	8.00	
Bupivacaine	30	31.80	10.91	

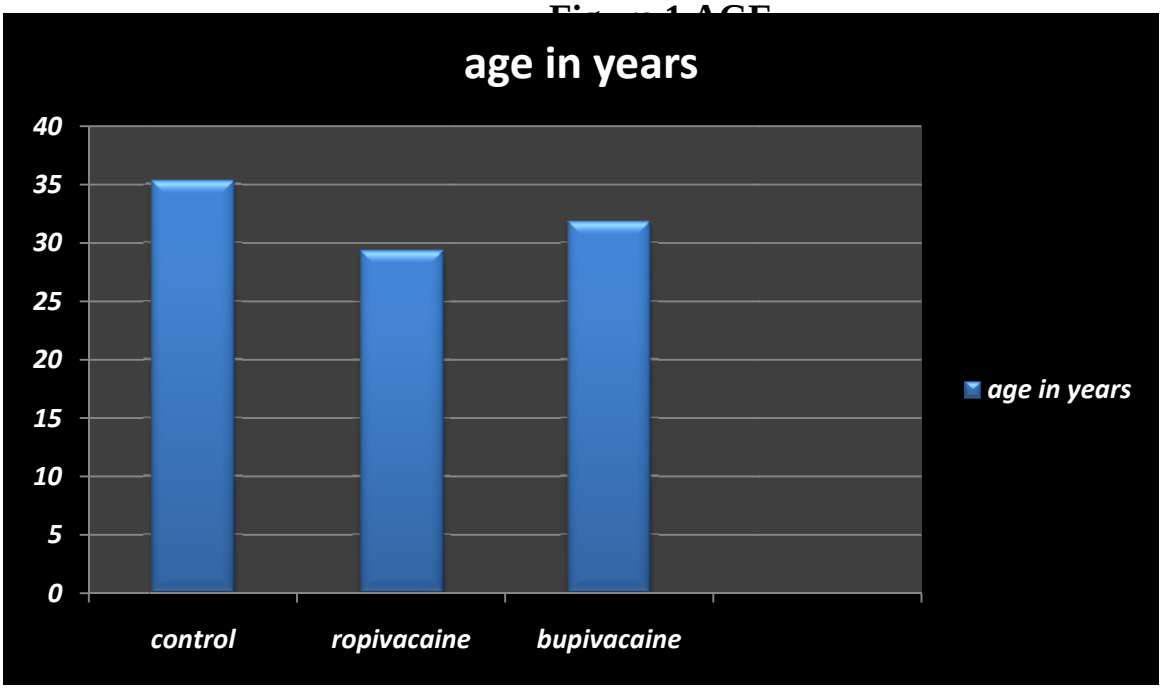


Table 2.Demographic profile: Sex

Group	Number	Male	female	P value
control	30	16	14	0.183 N.S
Ropivacaine	30	9	21	
Bupivacaine	30	12	18	

Figure 2 SEX

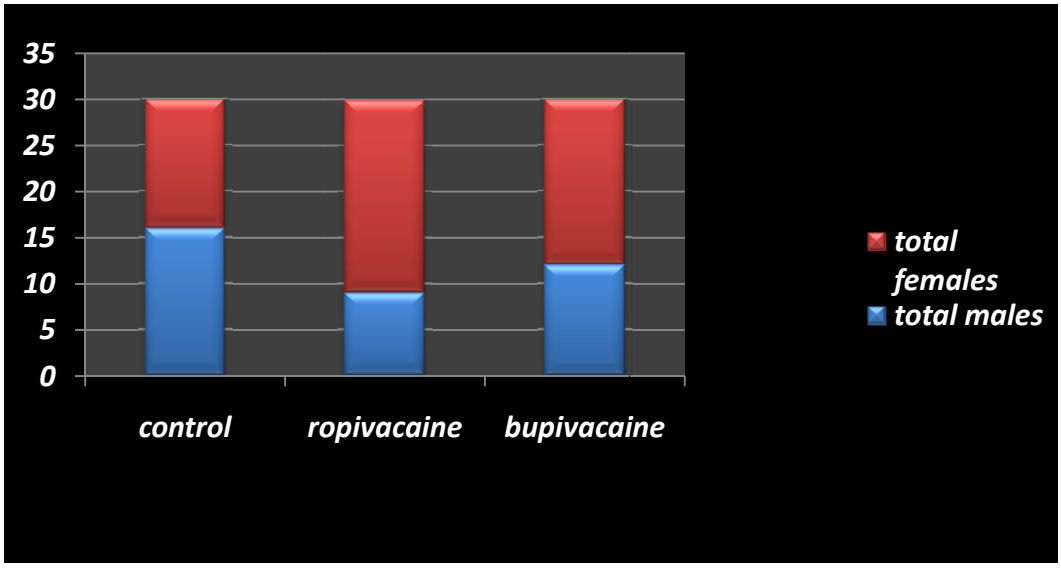


Table 3 : Demographic profile : Weight

Group	Number	Mean	SD	P value
control	30	60.57	8.67	0.245 N.S
Ropivacaine	30	59.60	11.16	
Bupivacaine	30	56.27	8.45	

Table 4 Demographic profile: Height

Group	Number	Mean	SD	P value
control	30	156.80	9.13	0.269 N.S
Ropivacaine	30	154.87	8.13	
Bupivacaine	30	152.97	9.23	

Table: 5 Demographic profile BMI

Group	Number	Mean	SD	P value
Control	30	24.11	3.66	0.711 N.S
Ropivacaine	30	24.83	4.33	
Bupivacaine	30	24.11	3.73	

N.s – not significant

Figure 3 BMI

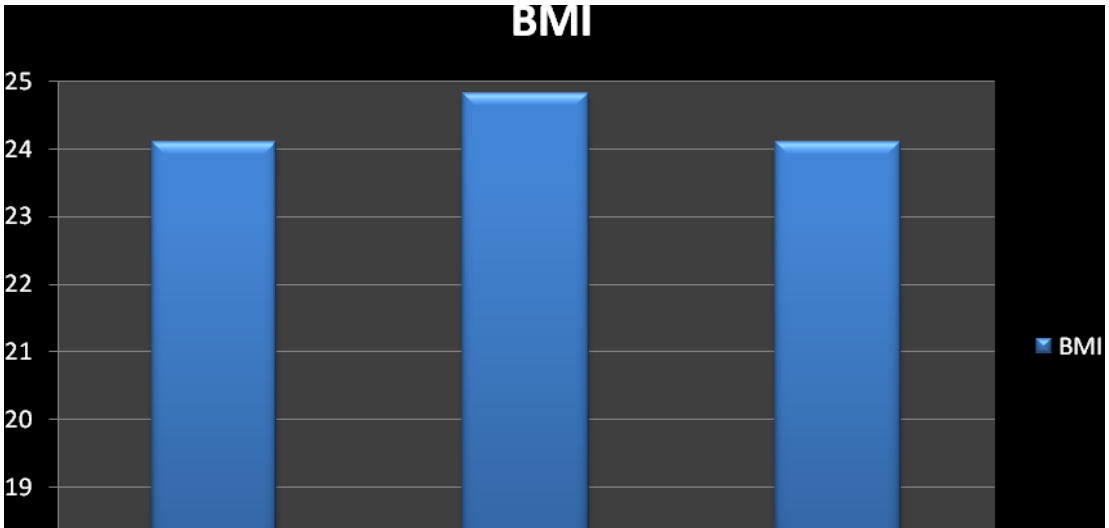
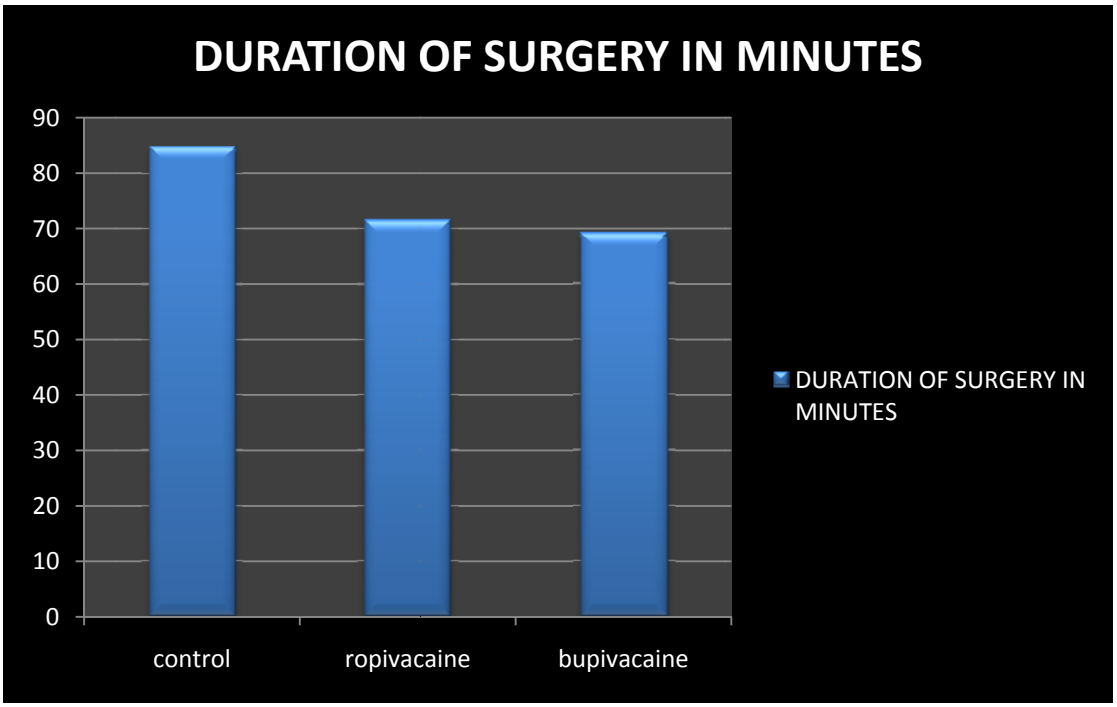


Table: 6 DURATION OF SURGERY

Group	Number	Mean	SD	P value
control	30	85	24.49	0.086 Not significant
Ropivacaine	30	71.67	37.77	
Bupivacaine	30	69.17	23.67	

Figure 4 DURATION OF SURGERY



VAS SCORE

When compared with control group, Bupivacaine and Ropivacaine both group had less VAS score.

- There was a significant difference in the VAS score between Bupivacaine, Ropivacaine and control group with p value <0.05 during the first five hours.

- During the first four hours there was no significant difference in the VAS score between Bupivacaine and Ropivacaine with $p > 0.05$.

- At fifth hour there was a significant difference in the VAS score between Bupivacaine (mean VAS-2.73) and Ropivacaine group (Mean VAS-3.10) with p = 0.01.Ropivacaine group had higher VAS. Pain was perceived earlier in the Ropivacaine group which needed additional analgesics.

- At sixth hour there was no significant difference in VAS score between all three groups with a mean VAS score 3.27±1.57, 3.10 ± 1.39 , 3.57±1 (mean± 2 SD) in Bupivacaine , Ropivacaine ,control group respectively with p =0.401 .Bupivacaine provided analgesia even up to six hours postoperatively.

- Pain threshold was maximum in the first hour and it was minimal in the sixth hour irrespective of the groups. These type of Laparoscopic surgeries required higher analgesics upto six hours post operatively. After six hours the analgesic requirements were found to be minimal.

Figure 6 VAS SCORE

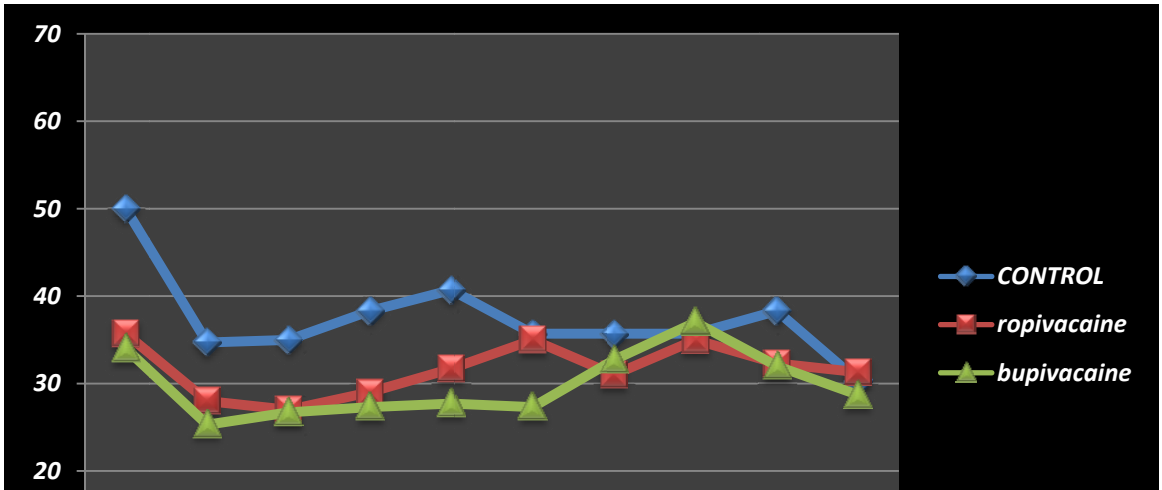


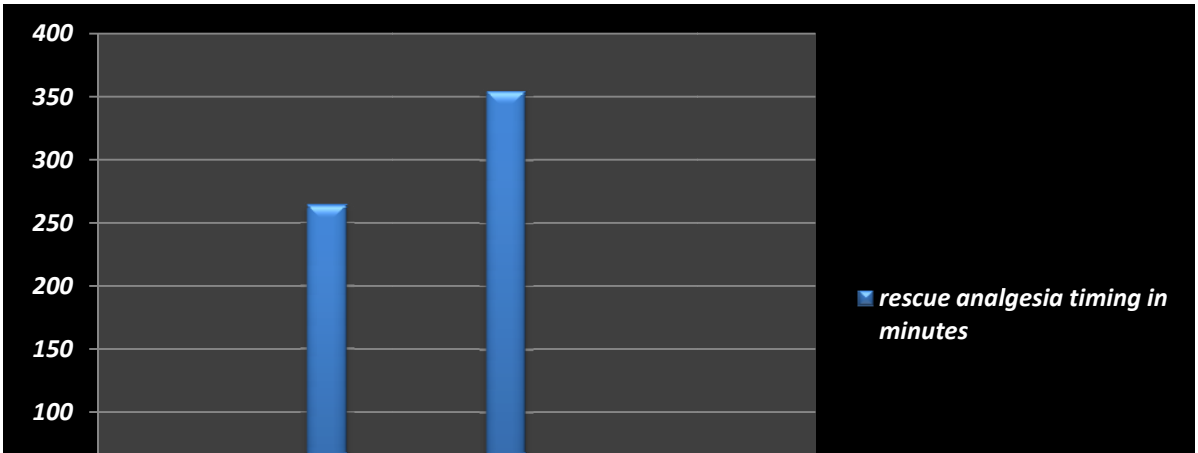
Table 7 : VAS SCORE

VAS MEAN	CONTROL	ROPIVACAINE	BUPIVACAINE	P value
0 HR	5.00	3.57	3.40	0.000*
1 HR	3.47	2.80	2.53	0.000*
2 HR	3.50	2.70	2.67	0.004*
3 HR	3.83	2.90	2.73	0.000*
4 HR	4.07	3.17	2.77	0.000*
5HR	3.57	3.50	2.73	0.002*
6 HR	3.57	3.10	3.27	0.401
10 HR	3.57	3.50	3.70	0.766
12 HR	3.83	3.23	3.20	0.133
24 HR	3.03	3.13	2.87	0.563

Table 8 RESCUE ANALGESIA TIMING

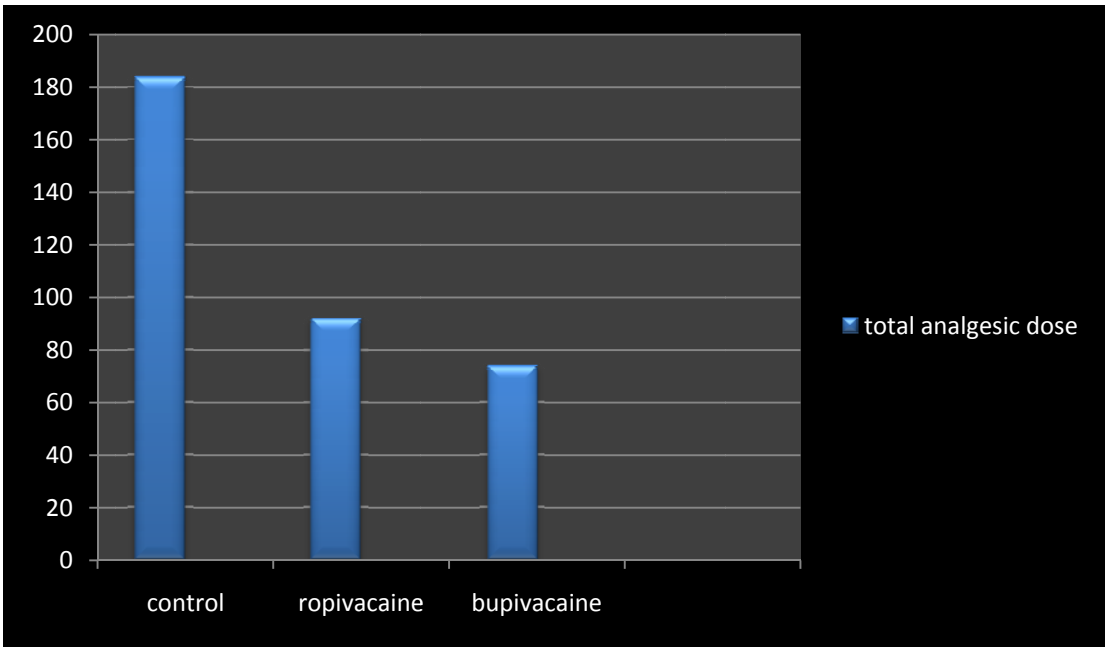
Group	Number	Mean	SD	P value
Control	30	12.90	13.38	0.000 significant
Ropivacaine	30	264.33	144.79	
Bupivacaine	30	355.00	25.24	

Figure 7 RESCUE ANALGESIA TIMING



- In control group rescue analgesia were given in 12.90+/- 13.38 minutes when compared with Bupivacaine, where it was 355 ± 25.24 minutes and for Ropivacaine, it was 264.33 ± 144.79 minutes postoperatively, which was found to be highly significant(p=0.000). This showed that Bupivacaine provided adequate analgesia for the first 6 hours when compared to Ropivacaine, which provided adequate analgesia for about 4 hours 24 minutes.

Figure 8 TOTAL ANALGESIC DOSE



- Total analgesic requirement was significantly less in local anesthetic groups compared to control group.

- Control group required 184±45.38 µg of Fentanyl compared to Bupivacaine group which required 74± 25.24 µgm of Fentanyl and Ropivacaine group which needed 92.33± 34.81 µ gm of Fentanyl with p= 0.000, which was statistically significant.

- Though, there was a difference in the amount of rescue analgesic requirement between bupivacaine(fentanyl 74± 25.24 µgm) and

Ropivacaine(fentanyl 92.33± 34.81 µ gm) groups, the difference was found to be statistically insignificant(p=0.126).

Table 9 TOTAL RESCUE ANALGESIC DOSE REQUIREMENT

Group	Number	Mean	SD	P value
Control	30	184	45.38	0.000 significant
Ropivacaine	30	92.33	34.81	
Bupivacaine	30	74.00	25.24	

Table 10,11 HEMODYNAMIC PARAMETERS

Table 10 :Mean arterial pressure

The Mean Arterial Pressure was monitored postoperatively in all the groups and were analysed statistically. The hemodynamics in all the groups was stable and was found to be statistically insignificant.

Figure 9 MEAN ARTERIAL PRESSURE

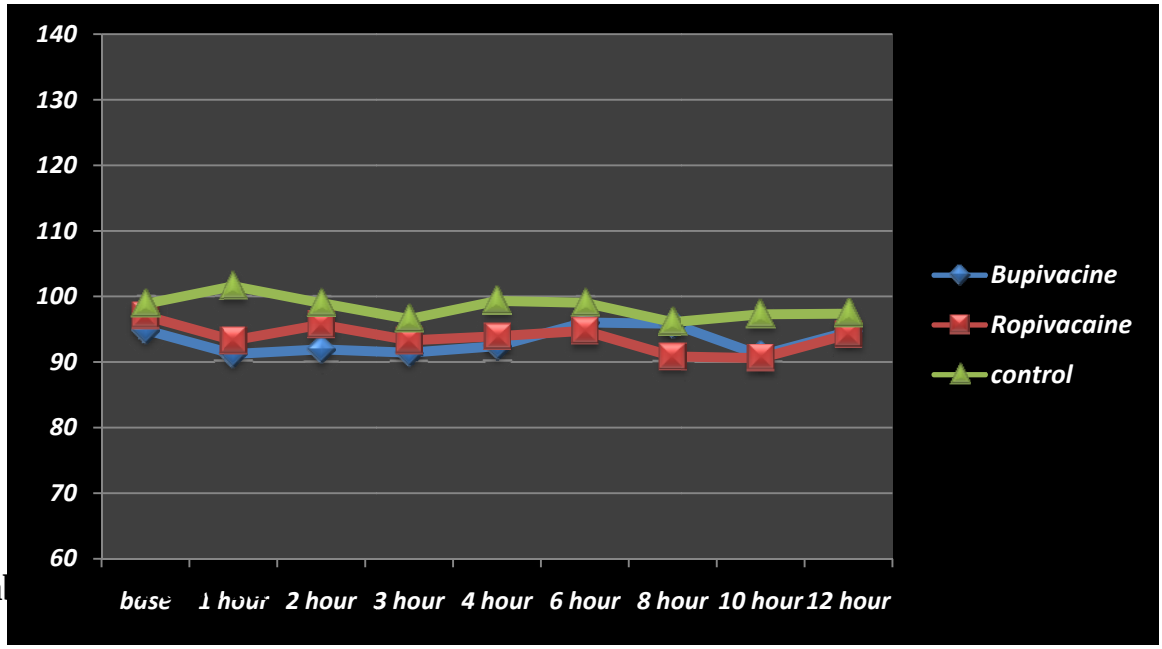


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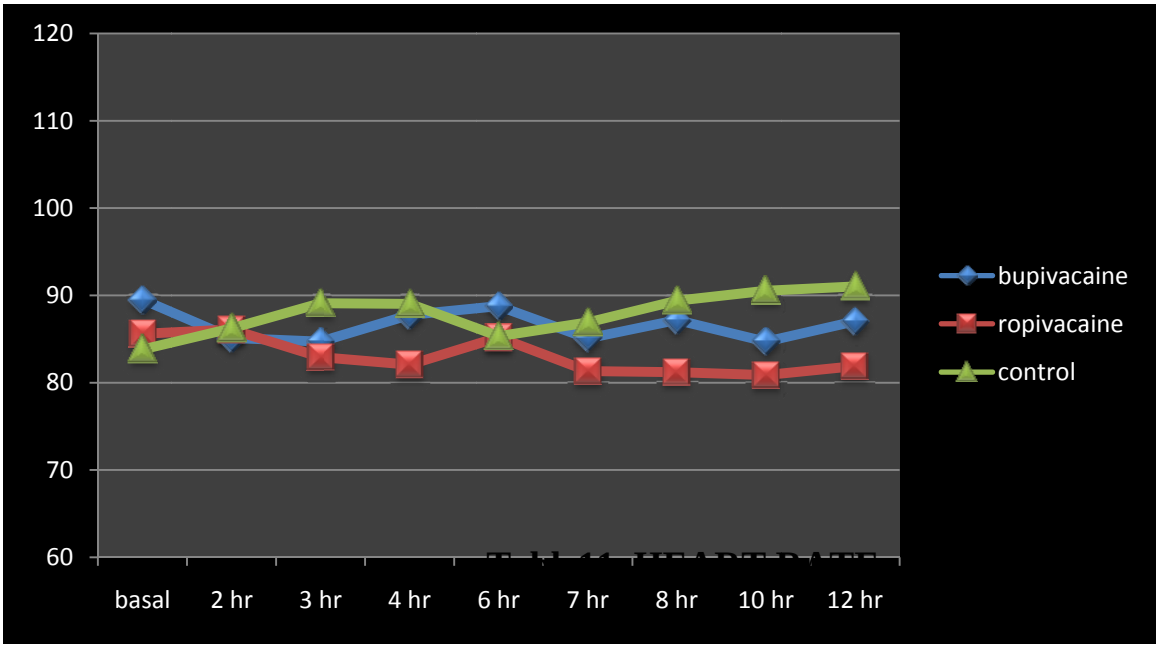
Table 10 MEAN ARTERIAL PRESSURE

	Group					
	Bupivacaine		Ropivacaine		Control	
	Mean	SD	Mean	SD	Mean	SD

Base	94.88	8.83	97.02	8.14	98.87	6.11
1 hour	91.23	7.69	93.31	6.97	101.58	7.05
2 hour	91.92	9.55	95.68	9.34	98.98	6.82
3 hour	91.42	7.61	93.30	10.61	96.54	12.06
4 hour	92.43	12.21	93.94	8.03	99.33	8.63
6 hour	96.04	12.82	94.76	9.59	99.04	9.09
8 hour	95.84	11.13	90.86	8.02	96.08	10.22
10 hour	91.04	8.29	90.60	9.47	97.27	10.11
12 hour	94.61	9.03	94.23	10.32	97.37	8.74

Figure 10 HEART RATE



time	Bupivacaine	Ropivacaine	Control	P value

PR	Mean	SD	Mean	SD	Mean	SD	
Basal	89.50	11.39	85.60	13.49	83.80	10.54	
2 hour	85.13	10.01	86.10	13.83	86.23	9.97	
3 hour	84.70	10.04	82.93	9.28	89.10	11.67	
4 hour	87.77	11.97	82.07	10.81	89.03	9.83	<0.05
6 hour	88.77	11.19	85.20	11.84	85.33	9.43	
7 hour	85.07	11.83	81.33	8.55	86.90	8.24	
8 hour	87.17	15.14	81.20	10.41	89.40	7.21	
10 hour	84.70	13.00	80.87	14.59	90.53	8.93	
12 hour	87.03	12.73	81.90	12.49	91.03	11.20	

The pulse rate was also monitored postoperatively and were compared among the groups. Though there were changes in the heart rate in all the groups, they were comparable and was shown to be statistically insignificant between the groups.

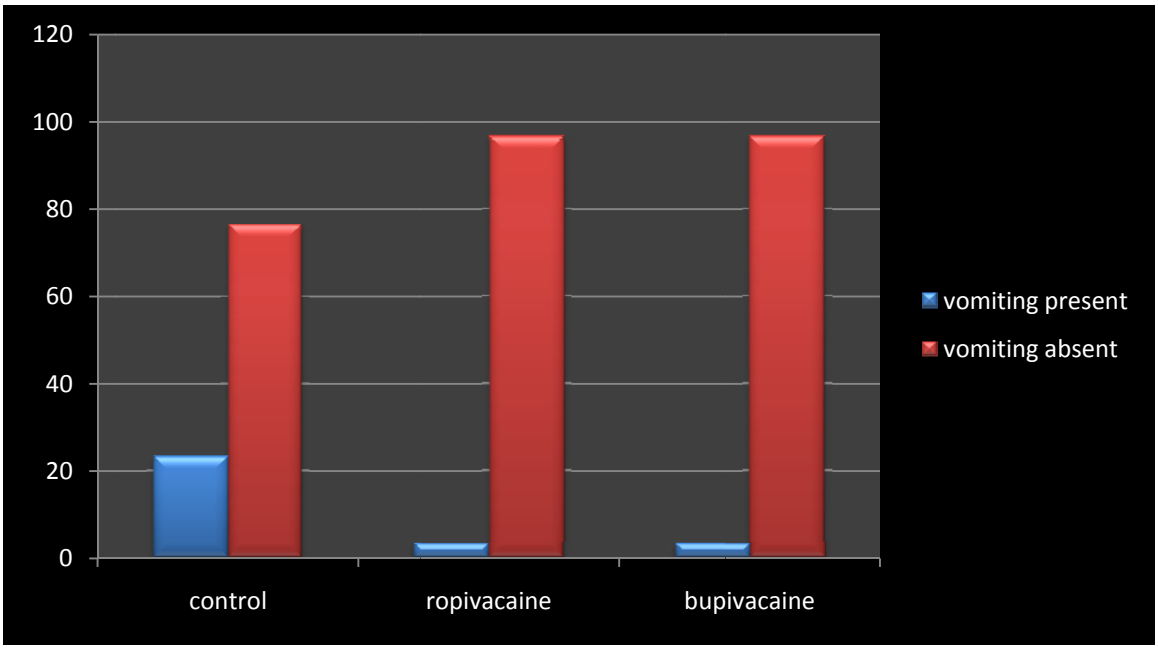
Table 12: NAUSEA AND VOMITING

- There was a significant reduction in nausea and vomiting in the patients who received Bupivacaine or Ropivacaine intraperitoneally.
- Among the 90 patients, 7 patients from the control group had postoperative vomiting, which was found to be statistically significant ($p = 0.012$)**,** when compared to Bupivacaine and Ropivacaine group, where the incidence of Postoperative vomiting was less(1 patient in each group)
- The reason for this high incidence of PONV(Post Operative Nausea Vomiting) in the control group, might be due to the higher requirement of rescue analgesia in the form of opioids(Fentanyl), which is one among the risk factors for PONV under Apfel's scoring(female, non-smokers, opioid use intraoperatively, History of PONV/ motion sickness)

Table 12: NAUSEA AND VOMITING

Group	Nausea &vomiting				P value
	YES		NO		
	total	%	total	%	
Control	7	23.3	23	76.66	
Ropivacaine	1	3.33	29	96.66	**0.012**
Bupivacaine	1	3.33	29	96.66	Significant

Figure 11 VOMITING



DISCUSSION:

Laparoscopic techniques have gained popularity in the recent years, mainly because of the fact that it involves small incision, short hospital stay and early ambulation. Though it has got various advantages on its own, the peritoneal stretching due to the insufflation of gases results in excessive pain postoperatively. Various modes of providing analgesia were tried. The techniques that can be used for providing pain relief in Laparoscopic surgeries include surgery under subarachanoid block, parentral opioids and NSAIDs, Instillation of local anaesthetics intraperitoneally, etc.,

Surgery under subarachanoid block provided adequate analgesia both intraoperatively and postoperatively, but the level of sensory block required intraoperatively was very high (Thoracic level 4), which resulted in higher hemodynamic instability. The time for ambulation postoperatively was also extended.

The use of parenteral opioids provided adequate analgesia, but the amount of drug required was higher, resulting in various complications like respiratory depression, postoperative nausea vomiting, constipation, pruritis which needs adequate postoperative monitoring thereby increasing the hospital stay.

Instillation of local anaesthetic solution intraperitoneally, as a mode of providing postoperative analgesia, has been studied extensively. It has the added advantage of early ambulation, reduced incidence of postoperative nausea vomiting and reduces the use of parentral opioids and NSAIDs.

This study was done to compare the analgesic efficacy of Bupivacaine and Ropivacaine, which were instilled intraperitoneally, with a control group.

All the groups were comparable with respect to the demographic datas including Age, Sex, Height, Weight, BMI etc… They were also comparable in terms of the duration of surgery.

In our study mean duration of pain relief in Bupivacaine group and Ropivacaine group was 355 ± 180.72 min and 264.33 ± 33 min respectively .In Saline group it was about 12.90+/- 13.38 minutes.

ANALGESIC REQUIREMENT:

In our study it was found that the total dose of opioid required in the post operative period was significantly less in both Bupivacaine and Ropivacaine group, when compared to the control group. Out of these two groups Bupivacaine group needed less Fentanyl 74 ± 25.24µg, when compared with Ropivacaine group which

needed 92.33 ± 34.81µg, though the difference was found to be statistically insignificant($p>0.05$). But the saline group needed double the dose 184µ ± 45.38µg, which was statistically significant ($p<0.05$).

This difference in the Fentanyl requirement closely correlates with the study done by ***Tae Han kim et al***[21] , where the total dose of Fentanyl consumed in Ropivacaine group was 367 ± 85.88 µg over 48 hour via PCA when compared to 535 ± 100.29µg in control group. This was statistically significant with a p value of <0.001.

Rajini gupta et al[22] also demonstrated the same in which saline vs Bupivacaine vs Bupivacaine and Fentanyl were compared. Total diclofenac consumption was about 65 ± 15mg in Bupivacaine with Fentanyl compared with saline 128 ± 25mg.

Palmes et al[23]**,** also supports our study in which they used 0.5% lignocaine before the pneumo peritoneum vs 0.5% lignocaine after the surgery. Analgesic piritramide consumption in both groups were 11.1 vs 18.5 with p=0.002 when compared to the control group.

Boddy AP[24]***,Mehta*** also concur our study.

Karaaslan[25] et al demonstrated less analgesic requirements (diclofenac) in the patients, who received 0.5% Bupivacaine 23.4± 35.9 mg compared with placebo (saline) group 70.0 +/- 59.9 mg.

Hernandez et al[26] used Metamizol as a rescue analgesia for post laparoscopic pain. In the patients who received Bupivacaine with morphine intra peritoneally consumed less Metamizol 2025 ± 1044 mg when compared with control 4925 ± 1238mg.

PAIN SCORE:

In our study the median VAS score for Bupivacaine group was 2.82 over 24 hours and in Ropivacaine group median VAS score was 3.15, which was found to be statistically significant($p<0.05$)

Malhotra et al in their study compared 0.125% bupivacaine with saline intraperitoneally. Mean VAS score at 2^{nd} and 4^{th} hour was 2,2 for Bupivacaine and 6,4 for saline group, which was similar to our study.

Mraovic[17] and coworkers used 0.5% of Bupivacine intra peritoneally after CO2 insufflation and after the dissection. They provided excellent analgesia upto 8 hours with less analgesic consumption. Our results were similar to this study with Bupivacaine instillation after the dissection.

Gupta A[28] with his colleagues compared Ropivacaine 0.5% with saline injected intra peritoneally near the gall bladder fossa. They kept the catheter at the gall bladder bed through which 20 ml Ropivacaine was given after the dissection. When compared with saline group, in patients who had Ropivacaine in the post operative period, had good VAS and better pain relief upto 4^{th} post operative hour. In our study we used Ropivacaine 0.5% as a single shot technique provided pain relief for 260 minutes which strongly correlates with this study.

Rajni Gupta et al[29] compared Bupivacine vs Bupivacaine with Fentanyl and saline. Patients who have received Bupivacaine with Fentanyl, showed VAS score 40.3 ± 7.4 compared with saline 50.1± 78. They proved that there was a narrow margin between the VAS score of both the groups. This study strongly supports our study, in which the median VAS score for Bupivacaine group was 2.82 over 24 hours and in Ropivacaine group median VAS score was 3.15 .

Andrei et al[30] and colleagues compared 100 mg of Bupivacaine with 150mg of Ropivacaine for intraperitoneal instillation. They were given 50mg higher dose of

ropivacine compared with Bupivacaine since Ropivacaine is less cardiotoxic. In both groups pain score and subcutaneous morphine consumption and vomiting were low, which was similar to our study. Due to higher dose of ropivacaine, morphine consumption was significantly less in Ropivacine group compared to bupivacaine group. Similar to our study, there was no significant variation in hemodynamics.

Hernándes et al [26] and his coworkers added an adjuvant with local anaesthetics to study the efficacy. They compared 0.25% Bupivacaine with 2mg intra peritoneal morphine and 0.25% Bupivacaine with 2mg i.v morphine. Rescue analgesic (Metamizol) requirement were lower in Bupivacaine with intraperitoneal morphine group(2025± 1044mg) when compared with Bupivacaine with i.v morphine (4125± 1276mg) during the first 6hours.So adding an adjuvant with lesser concentration of local anaesthetics will provide analgesia similar to the higher concentration of anaesthetics.

DURATION OF ANALGESIA:

In our study intraperitoneal instillation of Bupivacaine or Ropivacaine at the end of the surgery provided analgesia for 355 ± 180.72 min and 264.33 ± 33 min

when compared with saline group which was about 13 ± 26.93 minutes, which was found to be statistically significant (p)

Chou YJ [31]and coworkers used 0.5% Bupivacaine (50 mg) after the dissection, compared with the group which has received both before the pneumo peritoneum and after the dissection (100mg) group. In the patients who received Bupivacaine both before and after dissection had less pain when compared with placebo. But the duration of analgesia was up to 8hours, which also supports our study.

Shabir Ahmad et al[32] compared intra peritoneal Bupivacaine with intravenous tramadol for post operative pain relief in which the mean VAS in Bupivacaine group was at 1st ,2nd ,3rd , 4th and 5th hrs were 3.50, 2.80, 2, 1,30 and 0.06 respectively, but in tramadol group VAS was 2.20 ,1.83 ,1.40 ,1.07 and 0.7. Pain relief was better with i.v tramadol group than intraperitoneal group.

Narchi et al[33] ***compared*** intraperitoneal bupivacine with Ropivacaine and concluded that both were more effective in controlling the post operative pain with less analgesic requirements. The results were similar to our results

***Ljiljana et al*[34]** used 0.25% Bupivacaine vs 0.25% Bupivacaine+ 2mg Morphine .They have concluded that the post operative pain relief in intraperitoneal Bupivacaine with morphine was about 6 hours, which was similar to our study.

***Chundrigar et al*[35]** and his coworkers used 0.25% of Bupivacaine intraperitoneally and concluded VAS score was good with less analgesic requirement.

Szem et al [36]also showed the same duration of pain relief like our study. They used 0.1% Bupivacaine intraperitoneally. Pain relief was modest which lasted for 6 hours.

VOMITING:

In our study among the Bupivacaine, Ropivacaine group incidence of vomiting was 2.22% when compared with control group 7.77% which was clinically significant with p=0.012.

Andrei et al[30] in their study compared the post operative vomiting in the patients who received Bupivacaine, Ropivacaine intraperitoneally. They used 4 point scale for evaluation. Compared with control group (1.11) bupvacaine (0.41) and Ropivacaine (0.48) group experienced less vomiting. Antiemetic treatment was needed only 10% Bupivacaine group and 15% in Ropivacaine group compared with saline group which was about 43%.

HEMODYNAMICS:

In our study there was no significant hemodynamic changes noted. PR,BP,SPO2 were maintained within 20% of the normal limit through out the study.

Canan kucuk et al[11]***, Kang et al***[37]**,** and coworker showed there was no significant change in the hemodynamics during the study which was similar to our study.

COMPLICATIONS:

In our study no significant complications were noted like seizure and allergic reaction. ***Ljiljana Et al***[34] ***,Rajni gupta et al***[29]***, Andrei et al*** also demonstrated that their study was without any complications.

SUMMARY

From this prospective, randomised, comparative, double blinded, case control study which evaluated the effectiveness of intraperitoneal instillation of Bupivacaine compared with Ropivacaine for post operative pain relief after laparoscopic abdominal surgeries.

The following observations were noted…

1. The demographic profiles like Age, Sex, BMI, ASA status were comparable in all the groups.
2. Duration of post operative pain relief after intraperitoneal instillation of Bupivacaine was longer than Ropivacaine.
3. The VAS score was lower in Bupivacaine and Ropivacaine group when compared with saline group over the first 6 hours postoperatively.
4. Total Fentanyl requirement was lower in Bupivacaine and Ropivacaine group compared with saline group.
5. Post operative nausea and vomiting was significantly lower in both Ropivacaine and Bupivacaine group when compared to the control group.
6. Duration of surgery, hemodynamic parameters and complications were comparable in all groups

CONCLUSION

We conclude that intraperitoneal instillation of local anaesthetic drug is useful for post operative pain relief for patients undergoing laparoscopic surgeries and 0.5% Bupivacaine is a better analgesic when compared to intraperitoneal instillation of 0.5% Ropivacaine, with well maintained hemodynamics postoperatively.

BIBLIOGRAPHY:

1. Pain in Laparoscopy. Review article by J.I.Alexander , British Journal of Anaesthesia. 1997 ; 79 ; 369 -378

2.History of laparoscopic surgery.Vecchio R, MacFayden BV, Palazzo F.SourceDepartment of Surgery, University of Catania, Italy. Panminerva Med. 2000 Mar;42(1):87-90. PMID:11019611

3.ANJ journal of surgery.The Royal Australian college of surgeon.Arman kahoker, Taric sammour,Mattias soop,Volume 81,Issue 4,

4.Miller text book of Anaesthesia , 7th edition.

5.Stoelting text book of pharmacology.

6.Goldstein A, Grimault P, Henique A, Keller M, Fortin A, DaraiE.Preventing postoperative pain by local anesthetic instillation after laparoscopic gynecologic surgery: a placebo-controlled comparison of bupivacaine and ropivacaine.Departments of Anesthesiology and Gynecology, Hotel-Dieu Hospital Paris, PMID:10910857.

7.Alexander P. Boddy2h,Samir Mehta, BM, BCh and Michael Rhodes, MDthe Department of General Surgery, Norfolk and Norwich University Hospital, United Kingdom. Anaesthesia analgesia 2006 vol 102 (682-688)

8.N. Malhotra, K.K. Roy, C. Chanana, S. Kumar: Post-Operative Pain Relief After Operative Gynecological Laparoscopic Procedures With Intraperitoneal Bupivacaine. The Internet Journal of Gynecology and Obstetrics.2006 Volume 5 Number 2. DOI: 10.5580/208c

9. A double-blinded evaluation of intraperitoneal bupivacaine vs saline for the reduction of postoperative pain and nausea after laparoscopic cholecystectomy.Szem JW, Hydo L, Barie PS.Department of Surgery, New York Hospital-Cornell Medical Center, NY 10021, USA.

10.Muhammad Rizwan KhanMBBS, FCPS, FRCS Rushna Raza, MBBS

Syed Nabeel Zafar, MBBS, MPHFaisal Shamim, MBBS, FCPSIntraperitoneal lignocaine (lidocaine) *vs*bupivacaine after laparoscopic cholecystectomy.Journal of SurgicalResearchVolume 178, Issue 2 , Pages 662-669, December 2012

11.CananKucuk, NihalKadiogullari, OzgurCanoler, and SerpilSavlı.Department of Anesthesiology and Reanimation, Ankara Oncology Training and Research Hospital, Ankara, TurkeyA Placebo-Controlled Comparison of Bupivacaine andRopivacaine Instillation for Preventing Postoperative Pain AfterLaparoscopic Cholecystectomy.(Surgery Today (2007) 37:396–400)

12.Todorov G, Tzaneva P, Lukanova Ts, Velev G, Kojtchev A. The effect of intraperitoneal levobupivacain (Chirocaine) application on postoperative pain in laparoscopic cholecystectomy--a prospective study Khirurgiia (Sofiia). 2009

13.kocamanoglu snje@ana golubovi]vesna golubovi] vlatka soto[ek tokmad@i] clinic of anaesthesiology and intensive careclinical hospital centre rijekakre{imirova 42, 51000 rijeka, croatia snje`ana golubovi} clinic of anaesthesiology and intensive care - periodicum biologorum udc 57:61 vol. 111, no 2, 263–266, 2009

14.Artemisia Papadima,Emmanuel E Lagoudianakis,Pantalis antonakis.Repeated intraperitoneal instillation of levo bupivacaine for management of pain after laproscopic cholecystectomy. Ann plast surg 2009 jan 62(1)

15. Alkhamesi NA, Peck DH, Lomax D, Darzi AW.Intraperitoneal aerosolization of bupivacaine reduces postoperative pain in laparoscopic surgery: a randomized prospective controlled double-blinded clinical trial. Surg Endosc. 2007 Apr;21(4):602-6. Epub 2006 Dec 16.

16.Intraperitoneal application of bupivacaine plus morphine for pain relief after laparoscopic cholecystectomy.Hernández-Palazón J, Tortosa JA, Nuño de la Rosa V, Giménez-Viudes J, Ramírez G, Robles R.Department of Anaesthesia, Hospital Universitario 'Virgen de la Arrixaca', Murcia**.**Europian Journal of Anaesthesiol**o**gy. 2003 Nov;20(11):891-6.

17.Acta Anaesthesiology Scandinavia 1997 Feb;41(2):193-6.Intraperitoneal bupivacaine for analgesia after laparoscopic cholecystectomy.Mraović B, Jurisić T, Kogler-Majeric V, Sustic A.Department of Anaesthesiology and Intensive Care, General Hospital Sibenik, Croatia.

18. Superiority of preemptive analgesia with intraperitoneal instillation of bupivacaine before rather than after the creation of pneumoperitoneum for laparoscopic cholecystectomy: a randomized, double-blind, placebo-controlled study.Barczyński M, Konturek A, Herman RM.Department of GeneralSurgery,Jagiellonian University College of Medicine.PMID:16703434Surg Endosc. 2006 Jul;20(7):1088-93.

19**.** Pain relief following day case laparoscopic tubal ligation with intra-peritoneal ropivacaine: a randomised double blind control study.Dreher JK, Nemeth D, Limb R. Aust N Z J Obstet Gynaecol. 2000 Nov;40(4):434-7.

20. Post-laparoscopic cholecystectomy pain: effects of intraperitoneal local anesthetics on pain control--a randomized prospective double-blinded placebo-controlled trial.Ahmed BH, Ahmed A, Tan D, Awad ZT, Al-Aali AY, Kilkenny J 3rd, Orlando FA, Al-Chalabi A, Crass R, Alrawi SJ.Department of General SurgeryUniversity of Florida, Jacksonville, Florida 32209, USA PMID:183766

21. Tae Han kim. Intraperitoneal Ropivacaine Instillation for Postoperative Pain Reliefafter Laparoscopic Cholecystectomy Hyun Kang, Department of Anesthesiology andPain Medicine, College of Medicine, Chung-Ang University, 224-1, Departments of Surgery and 1Anesthesiology and Pain Medicine, College of Medicine,Chung-Ang University, Seoul, 2Department of Surgery, Kyungpook National University Hospital,School of Medicine, Kyungpook National University, Daegu,

22. Postoperative analgesia with intraperitoneal fentanyl andbupivacaine: a randomized control trialRajniGupta, J.Bogra, Nikhil Kothari, Monica Kohli. Department of Anaesthesia, CSMMU, Lucknow, U.P., India**.** Canadian Journal on Medicine Vol. 1, No. 1, April 2010

23. Randomized clinical trial of the influence of intraperitoneal local anaesthesia on pain after laparoscopic surgery.D D Palmes, S S Röttgermann, ... R R HorstmannBr J Surg 94(7):824-32 (2007), PMID 17571296
24.boddy

25. Pain Pract. 2006 Dec;6(4):237-41.Preemptive analgesia in laparoscopic cholecystectomy: a randomized controlled study.Karaaslan D, Sivaci RG, Akbulut G, Dilek ON.Department of Anesthesiology, Suleyman Demirel University, Isparta, Turkey

26 . Intraperitoneal application of bupivacaine plus morphine for pain relief after laparoscopic cholecystectomy.Hernández-Palazón J, Tortosa JA, Nuño de la Rosa V, Giménez-Viudes J, Ramírez G, Robles R.Department of Anaesthesia, Hospital Universitario 'Virgen de la Arrixaca', Murcia, Spain**.** Eur J Anaesthesiol. 2003 Nov;20(11):891-6.

27.Malhotra , K.K. Roy, C. Chanana, S. Kumar: Post-Operative Pain Relief After Operative Gynecological Laparoscopic Procedures With Intraperitoneal Bupivacaine. *The Internet Journal of Gynecology and Obstetrics*. 2006 Volume 5 Number 2. DOI: 10.5580/208c

28.Postoperative pain relief using intermittent injections of 0.5% ropivacaine through a catheter after laparoscopic cholecystectomy.Gupta A, Thörn SE, Axelsson K, Larsson LG, Agren G, Holmström B, Rawal N.Department of Anesthesiology, University Hospital, Orebro, Sweden. Anesth Analg. 2002 Aug;95(2):450-6, table of contents.

29.Canadian Journal on Medicine Vol. 1, No. 1, April 2010 Postoperative analgesia with intraperitoneal fentanyl and bupivacaine: a randomized control trial RajniGupta, J.Bogra, Nikhil Kothari, Monica Kohli. Department of Anaesthesia, CSMMU, Lucknow, U.P., India.

3**0.** Preventing Postoperative Pain by Local Anesthetic Instillation After Laparoscopic Gynecologic Surgery: A Placebo-Controlled Comparison of Bupivacaine and Ropivacaine Andrei Goldstein, MD*, Patrick Grimault, MD*,

Aude Henique, MD*, Michèle Keller, MD*, Anne Fortin, MD† and Emile Darai, MD, PhD†

31. Chou YJ.Preemptive analgesia installation during gynecologic laparoscopy: a randomized trial.Chou YJ, Ou YC, Lan KC, Jawan B, Chang SY, Kung FT.Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital, Kaohsiung, Taiwan. J Minim Invasive Gynecol. 2005 Jul-Aug;12(4):330-5

32. Postoperative Analgesia In Laparoscopic Cholecystectomy: A Comparative Study Using Bupivacaine Instillation And Infiltration Versus Parenteral Analgesia (Tramadol).Citation: S.A. Shabir, B. Saleem, A. Hakim, H. A. M.: Postoperative Analgesia In Laparoscopic Cholecystectomy: A Comparative Study Using Bupivacaine Instillation And Infiltration Versus Parenteral Analgesia (Tramadol).. *The Internet Journal of Anesthesiology*. 2011 Volume 29 Number 2. DOI: 10.5580/1315

33. Intraperitoneal local anaesthetic for shoulder pain after day-case laparoscopyP Narchi MD * a, D Benhamou MD a, H Fernandez MD b

34.Journal of Health Sciences .Volume 1, Number 2, September 2011
Acute postoperative pain relief, by intraperitoneal application of local anaesthesia during laparoscopic cholecystectomy. Ljiljana Gvozdenović*, Vesna Pajtić , Dejan Ivanov , Radovan Cvijano Sava Gavrilović1, Zoran Gojković , Saša Milić surgical Endoscopy. 1996 Jan;10(1):44-8.

35. Chundrigar**.** Annal Royal College of Surgeon England. 1993 November; 75(6): 437–439. PMCID: PMC2498009Intraperitoneal bupivacaine for effective pain relief after laparoscopic cholecystectomy.T. Chundrigar, A. R. Hedges, R. Morris, and J. D. Stamatakis

36.H.Kang and B.G Kim Intra peritoneal ropivacaine for effective pain relief after laproscopicappendectomy,department of anaesthesiology and pain medicine,Chunganguniversity,seol.Republic of korea. The journal of international medical research 2010 ,38,821-832.

36. A double-blinded evaluation of intraperitoneal bupivacaine vs saline for the reduction of postoperative pain and nausea after laparoscopic cholecystectomy.Szem JW, Hydo L, Barie PS.Department of Surgery, New York Hospital-Cornell Medical Center, NY 10021, USA.

37. The effect of intraperitoneal ropivacaine on pain after laparoscopic colectomy: a prospective randomized controlled trial.Yong Hee Park, Hyun Kang, Young Cheol Woo, Sun Gyoo Park, Chong Wha Baek, Yong Hun Jung, Jin Yun Kim, Gill Hoi Koo, Seong Deok Kim, Jun Seok Park Department of Anaesthesiology and Pain Medicine, Seoul National University College of Medicine, Seoul, Korea. Journal of Surgical Research (impact factor: 2.25). 11/2011; 171(1):94-100.

38. Bucciero M, Ingelmo PM, Fumagalli R, Noll E, Garbagnati A, Somaini M, Joshi GP, Vitale G, Giardini V, Diemunsch P. Intraperitoneal ropivacaine nebulization for pain management after laparoscopic cholecystectomy: a comparison with intraperitoneal instillation. *Anesth Analg*. 2011 Nov;113(5):1266-71. Epub 2011 Sep 14.

Information bulletin

Researcher name : **Dr. Sujatha, M.D (Anaesthesia)**

Participant name :

Research topic:

Comparison of Intraperitoneal instillation of Bupivacaine, Ropivacaine and saline for postoperative pain relief in laproscopic abdominal surgeries.

Purpose of the study:

During laparoscopic abdominal surgeries insufflation of co2 gas causes stretching of the peritoneum causes pain in the abdomen postoperatively.Intraperitoneal instillation of Bupivacaine or Ropivacaine relieve this pain in the postoperative period.

Nature of the study:

Participant who are all participating in the above mentioned study will get Bupivacaine or Ropivacaine or saline intraperitoneally via laparoscopy port after the procedure get over and will comparing the post operative pain relief of all the three.

Uses:

Post operative pain in the patient receiving Bupivacaine or Ropivacaine intraperitoneally will be very less than whom those not receiving and pulse rate and bp will be stable and post operative vomiting will be less.

<u>Complications</u>:

During the study patient will not get any problem.

If you don't want to participate in this study then you will get the usual pain relief in the post operatively.

Witness signature Participant name

Name Left thumb impression

Name

MASTER CHART

s.no	Name	age	sex	weight	height	BMI	diagnosis	surgery	group	duration	heart rate										systolic bp															
				Kg	cm					min	basal	0 min	10 min	20 min	30 min	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	10 hr	12 hours	basal	0 min	10 min	20 min	30 min	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	10 hr	12 hours	basal	0 min	10 min
1	susheela	44	f	50	148	22.83	sub ac cholecystitis	lap cholecystectomy	bupivacaine	90	92	89	93	86	82	91	91	83	82	76	78	76	102	82	83	123	130	134	122	126	122	122	122	126	136	132	124	144	126	124	70	82	87
2	sivagami	47	f	55	151	24.12	sub ac appendicitis	lap appendicectomy	bupivacaine	100	82	79	77	78	78	76	77	74	87	77	74	77	76	77	74	100	98	98	98	96	95	94	120	110	100	96	98	100	102	69	67	68
3	mashek	18	m	60	151	26.31	sub ac appendicitis	lap appendicectomy	bupivacaine	80	98	84	82	85	86	88	79	84	86	99	83	88	86	82	83	118	124	108	114	124	130	114	124	113	139	130	114	128	125	123	86	86	62
4	krishnaveni	46	f	52	146	24.39	cal cholecystitis	lap cholecystectomy	bupivacaine	80	86	87	80	71	79	78	78	72	77	97	100	108	88	87	86	137	139	138	130	140	142	138	139	136	132	152	139	142	136	136	70	72	76
5	padmavathi	26	f	55	156	22.6	cal cholecystitis	lap cholecystectomy	bupivacaine	40	96	97	98	98	88	87	90	88	92	115	88	87	86	82	88	133	135	133	146	142	132	132	136	132	162	132	132	136	133	132	83	96	99
6	deivanai	30	f	60	150	26.67	ovarian cyst	lap ovarian cystectomy	bupivacaine	55	100	96	91	92	87	88	89	78	112	99	89	88	88	88	78	134	114	113	112	122	122	112	126	145	128	112	118	117	118	119	83	82	86
7	nandhini	20	f	35	134	19.49	sub ac appendicitis	lap appendicectomy	bupivacaine	80	80	82	80	80	70	72	73	72	66	66	62	62	66	66	110	108	107	116	115	100	102	110	100	102	104	103	110	108	107	129	82	81	80
8	ramya	26	f	53	155	22.06	cal cholecystitis	lap cholecystectomy	bupivacaine	60	90	92	88	77	76	76	73	92	73	75	72	71	72	77	98	119	145	124	122	115	109	110	129	116	100	110	122	112	112	116	91	65	78
9	kumar	45	m	60	155	24.97	Tb abdomen	diag laproscopy	bupivacaine	50	102	98	99	96	93	94	92	98	92	92	88	92	94	92	110	122	131	133	120	121	121	110	108	100	106	100	106	110	121	120	110	130	90	93	92
10	vahitha	20	f	43	150	19.11	sub ac appendicitis	lap appendicectomy	bupivacaine	80	102	110	108	110	107	102	102	99	98	97	98	94	119	102	98	115	136	137	132	116	117	116	117	98	100	106	107	129	120	116	74	77	72
11	saravanan	25	m	60	165	22.04	sub ac appendicitis	lap appendicectomy	bupivacaine	70	89	88	86	92	87	87	87	84	82	90	88	78	97	86	87	134	135	144	131	127	123	121	121	120	122	126	124	148	121	124	85	84	84
12	mallga	53	f	53	145	25.21	sub ac appendicitis	lap appendicectomy	bupivacaine	40	88	102	104	99	98	88	83	82	84	110	88	86	82	78	87	140	142	144	142	131	110	121	122	123	148	122	122	132	112	113	88	92	94
13	valarmathi	35	f	62	142	30.75	sub ac appendicitis	lap appendicectomy	bupivacaine	60	88	76	78	79	80	82	88	87	88	76	99	76	77	78	78	130	130	132	131	130	126	127	122	124	121	149	122	127	124	121	70	72	76
14	ramani	30	f	65	144	31.35	cal cholecystitis	lap cholecystectomy	bupivacaine	120	88	92	96	92	94	88	99	88	78	72	74	77	72	74	78	127	130	132	140	132	131	156	123	122	121	118	121	128	124	121	77	89	88
15	sathish kumar	19	m	62	170	21.45	sub ac appendicitis	lap appendicectomy	bupivacaine	60	77	98	88	87	89	86	78	78	86	80	72	99	80	76	77	132	137	122	125	128	117	115	116	115	118	145	117	140	116	124	69	72	66
16	jamuna	35	f	60	150	26.67	ovarian cyst	lap ovarian cystectomy	bupivacaine	120	80	78	88	86	88	91	87	88	86	102	88	78	78	70	78	120	138	128	128	100	102	110	108	118	102	104	105	108	108	98	66	76
17	uthandi	63	m	60	165	22.04	cal cholecystitis	lap cholecystectomy	bupivacaine	90	75	78	80	82	84	88	78	87	110	80	82	88	83	82	87	140	156	142	143	148	132	134	135	160	134	135	135	135	146	132	90	98	98
18	savithri	36	f	70	155	29.14	cal cholecystitis	lap cholecystectomy	bupivacaine	50	102	98	99	96	93	94	92	98	92	92	88	92	94	92	110	122	131	133	120	121	121	110	108	100	106	110	121	120	110	130	90	93	92
19	roja malar	28	f	55	154	23.19	Tb abdomen	diag laproscopy	bupivacaine	80	102	110	108	110	107	102	102	99	98	97	98	94	119	102	98	115	136	137	132	116	117	116	117	98	100	106	107	129	120	116	74	77	72
20	sathish kumar	23	m	60	152	25.97	sub ac appendicitis	lap appendicectomy	bupivacaine	60	78	77	78	66	78	78	88	76	102	88	88	78	76	99	76	132	137	122	125	128	127	123	124	158	123	122	123	125	124	123	77	73	72
21	manikandan	24	m	70	170	24.22	sub ac appendicitis	lap appendicectomy	bupivacaine	60	86	86	87	87	77	89	80	90	91	87	95	81	102	82	74	110	116	115	112	114	117	127	123	112	115	118	128	150	117	110	78	76	88
22	dorathi	31	f	60	140	30.61	sub ac appendicitis	lap appendicectomy	bupivacaine	70	58	66	69	66	65	65	58	57	55	99	90	56	56	56	55	102	103	110	100	98	96	98	102	104	143	106	108	104	106	110	82	81	82
23	mahesh	24	m	55	160	21.48	sub ac appendicitis	lap appendicectomy	bupivacaine	80	76	78	68	67	67	76	79	78	88	87	110	110	122	121	110	118	119	118	110	112	110	118	121	112	117	150	123	110	113	113	78	66	68
24	vijay	35	m	60	160	23.44	Tb abdomen	diag laproscopy	bupivacaine	40	88	102	104	99	98	88	83	82	84	110	88	86	82	78	87	140	142	144	142	131	110	121	122	123	148	122	122	132	112	113	88	92	94
25	senthil	22	m	50	158	20.03	Tb abdomen	diag laproscopy	bupivacaine	60	88	76	78	79	80	82	88	87	88	76	99	76	77	78	78	130	130	132	131	130	126	127	122	124	121	149	122	127	124	121	70	72	76
26	savithri	38	f	60	140	30.61	sub ac appendicitis	lap appendicectomy	bupivacaine	40	88	102	104	99	98	88	83	82	84	110	88	86	82	78	87	140	142	144	142	131	110	121	122	123	148	122	122	132	112	113	88	92	94
27	anjaniyan	31	m	45	158	18.03	sub ac appendicitis	lap appendicectomy	bupivacaine	50	89	87	86	76	72	72	72	72	99	82	86	87	86	87	85	121	111	116	117	113	115	126	115	141	112	115	117	115	111	119	79	78	76
28	mahalakshmi	23	f	35	140	17.86	adhesive colitis	lap adhesiolysis	bupivacaine	25	112	115	102	98	97	96	96	97	97	110	98	92	88	88	89	102	126	133	124	122	121	121	118	115	149	113	116	118	116	119	88	95	88
29	duraivelu	25	m	65	165	23.88	sub ac appendicitis	lap appendicectomy	bupivacaine	80	95	98	97	92	88	88	87	88	76	78	110	88	84	91	82	116	115	117	118	116	117	118	120	121	122	149	121	107	104	108	88	67	66
30	tamilarasi	32	f	58	160	22.66	cal cholecystitis	lap cholecystectomy	bupivacaine	105	110	108	110	110	104	102	102	101	100	103	102	101	101	110	100	125	131	121	120	128	110	116	110	108	160	106	110	106	129	110	83	81	77
31	kumar	38	m	70	170	24.22	sub ac appendicitis	lap appendicectomy	bupivacaine	60	85	94	91	88	77	68	82	84	89	78	76	87	88	100	89	119	138	13	132	134	120	144	112	123	123	114	116	107	102	144	88	87	88
32	balagurusamy	42	m	70	175	22.86	cal cholecystitis	lap cholecystectomy	ropivacaine	70	76	78	72	76	77	77	74	72	74	77	102	77	76	74	73	121	113	128	126	119	121	118	119	127	123	138	117	109	104	112	66	64	72
33	vijayalakshmi	30	m	79	165	29.02	cal cholecystitis	lap cholecystectomy	ropivacaine	200	119	105	102	106	98	99	93	92	88	88	119	102	89	89	98	140	142	144	132	136	131	129	135	136	137	160	136	133	132	118	92	90	94
34	mariya	51	f	62	145	29.49	cal cholecystitis	lap cholecystectomy	ropivacaine	60	78	72	81	76	77	74	72	99	77	75	72	72	98	71	110	130	134	128	136	134	140	130	140	132	128	150	131	136	122	150	90	97	92
35	sathish kumar	22	m	60	150	26.67	sub ac appendicitis	lap appendicectomy	ropivacaine	50	96	97	82	89	91	76	110	78	77	79	81	84	77	72	77	110	110	112	114	100	102	140	102	110	102	124	124	113	113	112	82	84	78
36	tamilselvi	34	f	50	150	22.22	sub ac appendicitis	lap appendicectomy	ropivacaine	35	104	102	89	87	86	88	87	80	79	77	80	79	112	128	80	142	139	110	112	112	116	108	110	112	108	108	112	112	128	130	90	89	87
37	nathiya	25	f	50	152	21.64	cal cholecystitis	lap cholecystectomy	ropivacaine	30	80	78	76	72	74	72	66	69	88	67	76	66	62	68	79	130	130	131	110	116	117	98	99	130	98	99	92	90	92	100	93	94	78
38	divya	17	f	30	151	13.16	sub ac appendicitis	lap appendicectomy	ropivacaine	30	98	100	97	96	100	102	120	110	108	106	104	98	99	98	102	98	124	122	116	120	130	136	150	122	119	117	120	122	121	75	76	78
39	mary	29	f	65	150	28.89	cal cholecystitis	lap cholecystectomy	ropivacaine	40	96	97	82	89	91	76	110	78	77	79	81	84	77	72	77	110	110	112	114	100	102	140	102	110	102	124	124	113	113	112	82	84	78
40	nbakumari	26	f	55	148	25.11	sub ac appendicitis	lap appendicectomy	ropivacaine	80	82	81	82	80	78	80	88	78	81	78	99	88	88	76	76	122	121	120	116	110	100	112	108	106	104	120	103	100	110	110	68	68	67
41	sarthishwari	33	f	65	144	31.35	sub ac appendicitis	lap appendicectomy	ropivacaine	65	109	90	92	83	82	89	91	87	105	75	76	77	78	76	73	130	133	133	126	126	125	122	115	116	140	126	110	100	100	102	80	87	88
42	vijayalakshmi	35	f	60	146	28.15	cal cholecystitis	lap cholecystectomy	ropivacaine	70	78	90	99	96	78	80	78	80	82	89	82	88	86	88	100	123	144	143	128	120	124	126	110	112	121	116	117	110	118	140	88	95	94
43	thulasi	36	f	70	148	31.96	cal cholecystitis	lap cholecystectomy	ropivacaine	150	70	89	88	78	78	79	77	76	76	75	98	77	76	75	73	131	139	132	131	123	122	123	125	122	125	126	121	114	115	150	87	87	88
44	satham hussain	19	m	65	170	22.49	sub ac appendicitis	lap appendicectomy	ropivacaine	75	88	90	92	92	79	78	77	76	66	86	87	89	78	110	78	142	141	142	141	120	122	128	126	127	123	128	122	127	150	122	78	80	81
45	surendean	23	m	65	172	21.97	sub ac appendicitis	lap appendicectomy	ropivacaine	60	68	76	78	79	80	99	89	86	78	76	88	87	76	77	77	132	123	122	123	139	130	150	140	133	123	126	128	129	127	129	88	87	83
46	jessi prema	18	f	50	152	21.64	sub ac appendicitis	lap appendicectomy	ropivacaine	45	70	73	72	74	78	77	76	98	97	77	73	76	75	72	72	120	122	129	125	123	123	123	150	128	123	118	119	117	121	121	85	84	84
47	raji	30	f	45	148	20.54	sub ac appendicitis	lap appendicectomy	ropivacaine	90	78	88	94	98	87	88	86	85	98	77	78	76	78	71	76	112	125	122	116	116	112	122	121	139	121	119	118	117	116	120	76	77	76
48	ammini	29	f	70	154	29.52	cal cholecystitis	lap cholecystectomy	ropivacaine	80	90	88	90	92	91	88	92	78	76	75	73	66	65	65	63	110	110	112	108	110	109	140	109	102	105	104	102	104	109	110	78	72	77
49	anbarasi	27	f	50	156	20.55	cal cholecystitis	lap cholecystectomy	ropivacaine	50	96	97	82	89	91	76	110	78	77	79	81	84	77	72	77	110	110	112	114	100	102	140	102	110	102	124	124	113	113	112	82	84	78
50	ponnuthai	40	f	45	148	20.54	cal cholecystitis	lap cholecystectomy	ropivacaine	30	78	79	78	87	75	76	73	76	98	77	77	73	76	75	72	110	110	110	112	114	100	102	122	128	126	127	123	128	122	127	80	87	88
51	suganya	19	f	35	142	17.36	cal cholecystitis	lap cholecystectomy	ropivacaine	110	70	89	88	78	78	79	77	76	76	75	98	77	76	75	73	131	139	132	131	123	122	123	125	122	125	126	121	114	115	150	87	87	88
52	devi	34	f	60	155	24.97	cal cholecystitis	lap cholecystectomy	ropivacaine	60	78	72	81	76	77	74	72	99	77	75	72	72	98	71	110	130	134	128	136	134	140	130	140	132	128	150	131	136	122	150	90	97	92
53	balamurugan	24	f	67	156	27.53	sub ac appendicitis	lap appendicectomy	ropivacaine	50	96	97	82	89	91	76	110	78	77	79	81	84	77	72	77	110	110	112	114	100	102	140	102	110	102	124	124	113	113	112	82	84	78
54	kannan	28	m	70	170	24.22	sub ac appendicitis	lap appendicectomy	ropivacaine	60	90	92	88	77	76	76	73	92	73	75	72	71	72	77	98	119	145	124	122	115	109	110	129	116	100	110	122	112	112	116	91	65	78
55	shakila	26	f	55	160	21.48	sub ac appendicitis	lap appendicectomy	ropivacaine	80	82	81	82	80	78	80	88	78	81	78	99	88	88	76	76	122	121	120	116	110	100	112	108	106	104	120	103	100	110	110	68	68	67
56	padmavathi	33	f	65	152	28.13	sub ac appendicitis	lap appendicectomy	ropivacaine	65	109	90	92	83	82	89	91	87	105	75	76	77	78	76	73	130	133	133	126	126	125	122	115	116	140	126	110	100	100	102	80	87	88
57	neela	35	f	60	151	26.31	cal cholecystitis	lap cholecystectomy	ropivacaine	70	78	90	99	96	78	80	78	80	82	89	86	88	88	100	123	144	143	128	120	124	126	110	112	121	116	117	110	118	140	88	95	94
58	devi	36	f	70	152	30.3	cal cholecystitis	lap cholecystectomy	ropivacaine	150	70	89	88	78	78	79	77	76	76	75	98	77	76	75	73	131	139	132	131	123	122	123	125	122	125	126	121	114	115	150	87	87	88
59	anand	19	m	65	158	26.04	sub ac appendicitis	lap appendicectomy	ropivacaine	75	88	90	92	92	79	78	77	76	66	86	87	89	78	110	78	142	141	142	141	120	122	128	126	127	123	128	122	127	150	122	78	80	81
60	arivu	23	m	65	156	26.71	sub ac appendicitis	lap appendicectomy	ropivacaine	60	68	76	78	79	80	99	89	86	78	76	88	87	76	77	77	132	123	122	123	139	130	150	140	133	123	126	128	129	127	129	88	87	83
61	venkatesan	55	m	60	178	18.94	cal cholecystitis	lap cholecystectomy	control	100	110	78	76	75	106	113	98	99	97	88	88	89	102	98	113	130	142	141	134	144	141	137	132	132	126	134	142	150	122	134	80	99	98
62	sameera	19	f	35	160	13.67	sub ac appendicitis	lap appendicectomy	control	80	90	118	116	121	110	99	110	112	102	98	99	96	98	92	110	110	140	142	136	154	134	152	134	132	151	134	123	156	133	123	78	88	78
63	prama	53	m	64	158	25.64	cal cholecystitis	lap cholecystectomy	control	55	97	97	92	98	88	92	100	110	108	98	112	92	98	98	118	102	132	134	123	124	125	144	131	134	132	153	122	123	145	132	80	87	87
64	kanthamani	55	m	60	170	20.76	sub ac appendicitis	lap appendicectomy	control	60	82	78	76	76	76	78	78	83	78	78	77	78	97	92	99	130	125	126	124	122	138	121	118	140	121	123	140	122	134	123	80	82	78
65	chellammal	52	f	60	156	24.65	sub ac appendicitis	lap appendicectomy	control	100	92	88	87	86	78	78	77	88	102	78	72	76	87	88	87	130	148	123	122	123	143	123	132	133	125	123	145	144	123	123	90	88	88
66	arul	30	m	60	170	20.76	sub ac appendicitis	lap appendicectomy	control	120	80	98	99	96	96	94	92	98	88	98	98	86	97	90	98	99	130	149	148	145	142	132	119	120	121	136	131	122	122	123	123	78	102	103
67	suganthi	18	f	55	140	28.06	sub ac appendicitis	lap appendicectomy	control	70	88	87	84	84	86	88	78	87	89	88	88	88	88	88	99	90	122	128	126	126	124	132	122	124	127	128	134	132	125	124	132	80	78	78
68	vennila	22	f	50	154	21.08	Tb abdomen	diag laproscopy	control	55	88	104	103	103	102	102	101	111	98	98	97	92	97	98	98	123	144	144	142	141	140	140	142	133	132	136	132	123	134	124	88	84	83
69	girl	34	f	55	155	22.89	sub ac appendicitis	lap appendicectomy	control	70	88	104	103	103	102	102	101	111	98	98	97	92	97	98	98	123	144	144	142	141	140	140	142	133	132	136	132	123	134	124	88	84	83
70	arjun	47	m	50	170	17.3	sub ac appendicitis	lap appendicectomy	control	120	92	88	87	86	78	78	77	88	102	78	72	76	87	88	87	130	148	123	122	123	143	123	132	133	125	123	145	144	123	123	90	88	88
71	thiyagarajan	30	m	55	160	21.48	sub ac appendicitis	lap appendicectomy	control	80	88	98	99	96	96	94	92	98	88	98	86	97	90	98	99	130	149	148	145	142	132	119	120	121	136	131	122	122	123	123	78	102	103
72	vennila	32	f	50	154	21.08	sub ac appendicitis	lap appendicectomy	control	110	92	87	84	84	86	88	78	87	89	88	88	88	88	99	90	122	128	126	126	124	132	122	124	127	128	134	132	125	124	132	80	78	78
73	caroline	50	m	55	156	22.6	cal cholecystitis	lap cholecystectomy	control	80	78	80	83	78	87	74	78	76	78	88	79	78	80	78	78	132	144	140	146	144	138	136	138	132	124	132	126	125	143	140	82	88	86
74	sugantha	28	f	66	160	25.78	sub ac appendicitis	lap appendicectomy	control	80	98	98	92	94	93	92	78	76	77	75	77	98	99	102	100	122	121	124	122	134	135	135	136	133	128	144	146	141	136	140	78	77	78
75	anbarasi	27	f	50	160	19.53	sub ac appendicitis	lap appendicectomy	control	60	80	82	89	76	78	80	82	88	89	89	87	87	88	90	78	100	140	125	112	128	126	114	118	142	147	127	125	103	119	117	60	99	90
76	munusamy	45	M	50	158	20.03	sub ac appendicitis	lap appendicectomy	control	70	92	88	87	86	78	78	77	88	102	78	72	76	87	88	87	130	148	123	122	123	143	123	132	133	125	123	145	144	123	123	90	88	88
77	kalidoss	26	M	58	168	20.55	cal cholecystitis	lap cholecystectomy	control	80	88	98	98	96	96	94	92	98	88	98	86	97	90	98	99	130	149	148	145	142	132	119	120	121	136	131	122	122	123	123	78	102	103
78	sampath	55	M	60	170	20.76	sub ac appendicitis	lap appendicectomy	control	110	92	87	84	84	86	88	78	87	89	88	88	88	88	99	90	122	128	126	126	124	132	122	124	127	128	134	132	125	124	132	80	78	78
79	murugan	39	M	50	175	16.33	sub ac appendicitis	lap appendicectomy	control	75	78	80	83	78	87	74	78	76	78	88	79	78	80	78	78	132	144	140	146	144	138	136	138	132	124	132	126	125	143	140	82	88	86
80	gopi kannan	20	M	60	176	19.37	sub ac appendicitis	lap appendicectomy	control	80	98	98	92	94	93	92	78	76	77	75	77	98	99	102	100	122	121	124	122	134	135	135	136	133	128	144	146	141	136	140	78	77	78
81	dhanalakshmi	55	F	58	155	24.14	cal cholecystitis	lap cholecystectomy	control	75	80	82	89	76	78	80	82	88	89	89	87	87	88	90	78	100	140	125	112	128	126	114	118	142	147	127	125	103	119	117	60	99	90
82	durai raj	55	M	60	160	23.44	sub ac appendicitis	lap appendicectomy	control	100	72	102	110	108	116	112	98	92	99	96	94	92	93

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